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History of Science, Philosophy and Culture in Indian Civilization

General Editor D.P. Chattopadhyaya

Volume IV Part 2

Medicine and Life Sciences in India

edited by

B.V. SUBBARAYAPPA

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Volume IV Part 2

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The Volumes of the PROJECT ON THE HISTORY OF SCIENCE, PHILOSOPHY AND CULTURE IN INDIAN CIVILIZATION aim at discovering the main aspects of India's heritage and present them in an interrelated way. These volumes, in spite of their unitary look, recognise the difference between the areas of material civilization and those of ideational culture. The Project is not being executed by a single group of thinkers and writers who are methodologically uniform or ideologically identical in their commitments. In fact contributions are made by different scholars with different ideological persuasions and methodological approaches. The Project is marked by what may be called 'methodological pluralism'.

In spite of its primary historical character, this Project, both in its conceptualization and execution, has been shaped by many scholars drawn from different disciplines. It is for the first time that an endeavour of such a unique and comprehensive character has been undertaken to study critically a major world civilization like India.

The spectrum of this Volume encompasses the substantive dimensions of Vedic medicine; Ayurveda, Unani and Siddha systems; a comparative overview of them; yoga; folk-medicine; Indian medicine in the colonial period; an appraisal of Indian pharmaceuticals; traditional knowledge of plants and animals, besides an introductory perspective on traditional medicine.

In its twenty-two chapters contributed by experts in their fields, this Volume endeavours to present authentic and critical insights into the nature and structure as well as the expanse of medicine in India. It has an extensive bibliography of over eight hundred titles, both primary and secondary, for further studies by those who are interested in Indian medicine.

This Volume is perhaps the first of its type in providing under one cover practically a complete picture of medicine as developed in India right from the Vedic times.

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Dedicated to
Professor D.P. Chattopadhyaya Ji
whose intellect and humanism have been a source of inspiration to me.

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Preface

The origins and development of medicine, both traditional and modern, are indeed fascinating. Few will deny the seminal role of medicine in engendering human progress from times immemorial. In fact human progress and medicine are inseparable.

Indian culture area, like the other contemporaneous ones, developed its medicinal practices, eventually leading to a medical system called the *Ayurveda*—a system that attracted the attention of even foreign lands both in the west and east in the ancient period. Ayurveda's past is also its present since its importance and relevance have been realized not only in the country of its origin but also in several other countries including USA, UK, Germany, Switzerland, the Netherlands, Italy, Australia and Japan.

Medicine knows no barriers of religion or region. In the medieval period, the Greco-Arabic medicine, called *Unani* in India, that entered India through the portals of Islamic impact, has found a congenial home. Earlier, perhaps inspired by the Chinese alchemical and pharmaceutical practices, but Indianised soon in the tāntrik milieu, mineral medicines of different character began to be prepared with elaborate processing under the names of *Rasaśāstra* and the *Siddha* System, the latter being confined to Tamilnadu. The traditional Indian medical trinity—Ayurveda, of which the *Rasaśāstra* has become a part, Unani and the Siddha—has been contributing in no small measure to the medicare of the vast population of India, then as now.

The spectrum of this Volume encompasses various aspects of Ayurveda, Unani and Siddha systems; a comparative overview on them; yoga; folk medicine; an appraisal of the Indian pharmaceuticals; Indian medicine in the colonial period; and the traditional knowledge of plants and animals, besides an introductory perspective on traditional medicine. The Editor is conscious that a separate chapter on traditional veterinary medicine could have been included in this volume. But his efforts to find a suitable scholar who could prepare a data-based chapter on veterinary medicine, did not meet with success.

I am specially beholden to Professor D.P. Chattopadhyaya, the most eminent philosopher and Director of the Project of History of Indian Science, Philosophy and Culture and Founder-Chairman of the Centre for Studies in Civilizations, for giving me the opportunity to edit this volume. His constant guidance and encouragement have been a source of inspiration for me.

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B.V. Subbarayappa
Editor

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Table of Transliterations

अ	a	आ	ā	इ	i	ई	ī		
उ	u	ऊ	ū	ऋ	ṛ	ॠ	ṝ		
ऌ	ḷ	ए	e	ऐ	ai	ओ	o		
औ	au	अं	aṁ	अः	aḥ				
क्	k	ख्	kh	ग्	g	घ्	gh	ङ्	ṅ
च्	c	छ्	ch	ज्	j	झ्	jh	ञ्	ñ
ट्	ṭ	ठ्	ṭh	ड्	ḍ	ढ्	ḍh	ण्	ṇ
त्	t	थ्	th	द्	d	ध्	dh	न्	n
प्	p	फ्	ph	ब्	b	भ्	bh	म्	m
य्	y	र्	r	ल्	l	व्	v		
श्	ś	ष्	ṣ	स्	s	ह्	h		
ळ्	ḷ	क्ष्	kṣ	त्र्	tr	ज्ञ्	jñ		

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General Introduction

I

It is understandable that man, shaped by Nature, would like to know Nature. The human ways of knowing Nature are evidently diverse, theoretical and practical, scientific and technological, artistic and spiritual. This diversity has, on scrutiny, been found to be neither exhaustive nor exclusive. The complexity of physical nature, life-world and, particularly, human mind is so enormous that it is futile to follow a single method for comprehending all the aspects of the world in which we are situated.

One need not feel bewildered by the variety and complexity of the worldly phenomena. After all, both from traditional wisdom and our daily experience, we know that our own nature is not quite alien to the structure of the world. Positively speaking, the elements and forces that are out there in the world are also present in our body-mind complex, enabling us to adjust ourselves to our environment. Not only the natural conditions but also the social conditions of life have instructive similarities between them. This is not to underrate in any way the difference between the human ways of life all over the world. It is partly due to the variation in climatic conditions and partly due to the distinctness of production-related tradition, history and culture.

Three broad approaches are discernible in the works on historiography of civilization, comprising science and technology, art and architecture, social sciences and institutions. Firstly, some writers are primarily interested in discovering the general laws which govern all civilizations spread over different continents. They tend to underplay what they call the noisy local events of the external world and peculiarities of different languages, literatures and histories. Their accent is on the unity of Nature, the unity of science and the unity of mankind. The second group of writers, unlike the generalists or transcendentalists, attach primary importance to the distinctiveness of every culture. To these writers human freedom and creativity are extremely important and basic in character. Social institutions and the cultural articulations of human consciousness, they argue, are bound to be expressive of the concerned people's consciousness. By implication they tend to reject concepts like archetypal consciousness, universal mind and providential history. There is a third group of writers who offer a composite picture of civilizations, drawing elements both from their local as well as common characteristics. Every culture has its local roots and peculiarities. At the same time, it is pointed out that due to demographic migration and immigration over the centuries an element of compositness emerges almost in every culture. When due to a natural calamity or political exigencies people move from one part of the world to another, they carry with them, among other things, their language, cultural inheritance and their ways of living.

In the light of the above facts, it is not at all surprising that comparative anthropologists and philologists are intrigued by the striking similarity between different language families and the rites, rituals and myths of different peoples. Speculative

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philosophers of history, heavily relying on the findings of epigraphy, ethnography, archaeology and theology, try to show in very general terms that the particulars and universals of culture are 'essentially' or 'secretly' interrelated. The spiritual aspects of culture like dance and music, beliefs pertaining to life, death and duties, on analysis, are found to be mediated by the material forms of life like weather forecasting, food production, urbanization and invention of script. The transition from the oral culture to the written one was made possible because of the mastery of symbols and rules of measurement. Speech precedes grammar, poetry prosody. All these show how the 'matters' and 'forms' of life are so subtly interwoven.

II

The PHISPC publications on History of Science, Philosophy and Culture in Indian Civilization, in spite of its unitary look, do recognize the differences between the areas of material civilization and those of ideational culture. It is not a work of a single author. Nor is it being executed by a group of thinkers and writers who are methodologically uniform or ideologically identical in their commitments. In conceiving the Project we have interacted with, and been influenced by, the writings and views of many Indian and non-Indian thinkers.

The attempted unity of this Project lies in its aim and inspiration. We have in India many scholarly works written by Indians on different aspects of our civilization and culture. Right from the pre-Christian era to our own time, India has drawn the attention of various countries of Asia, Europe and Africa. Some of these writings are objective and informative and many others are based on insufficient information and hearsay, and therefore not quite reliable, but they have their own value. Quality and view-points keep on changing not only because of the adequacy and inadequacy of evidence but also, and perhaps more so, because of the bias and prejudice, religious and political conviction, of the writers.

Besides, it is to be remembered that history, like Nature, is not an open book to be read alike by all. The past is mainly enclosed and only partially disclosed. History is, therefore, partly objective or 'real' and largely a matter of construction. This is one of the reasons why some historians themselves think that it is a form of literature or art. However, it does not mean that historical construction is 'anarchic' and arbitrary. Certainly, imagination plays an important role in it.

But its character is basically dependent upon the *questions* which the historian raises and wants to understand or answer in terms of the ideas and actions of human beings in the past ages. In a way, history, somewhat like the natural sciences, is engaged in answering questions and in exploring relationships of cause and effect between events and developments across time. While in the natural sciences, the scientist poses questions about nature in the form of hypotheses, expecting to elicit authoritative answers to such questions, the historian studies the past, partly for the sake of understanding it for its own sake and partly also for the light which the past throws upon the present, and the possibilities which it opens up for moulding the future. But the difference between the two approaches must not be lost sight of. The scientist is primarily interested in discovering laws and framing theories, in terms of which different events and processes can be connected and anticipated. His interest in the conditions or circumstances attending the

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concerned events is secondary. Therefore, scientific laws turn out to be basically abstract and easily expressible in terms of mathematical language. In contrast, the historian's main interest centres round the *specific* events, human ideas and actions, not *general* laws. So, the historian, unlike the scientist, is obliged to pay primary attention to the circumstances of the events he wants to study. Consequently, history, like most other humanistic disciplines, is concrete and particularist. This is not to deny the obvious truth that historical events and processes consisting of human ideas and actions show some trend or other and weave some pattern or other. If these trends and patterns were not there at all in history, the study of history as a branch of knowledge would not have been profitable or instructive. But one must recognize that historical trends and patterns, unlike scientific laws and theories, are not general or purported to be universal in their scope.

III

The aim of this Project is to discover the main aspects of Indian culture and present them in an interrelated way. Since our culture has influenced, and has been influenced by, the neighbouring cultures of West Asia, Central Asia, East Asia and South-East Asia, attempts have been made here to trace and study these influences in their mutuality. It is well known that during the last three centuries, European presence, both political and cultural, in India has been very widespread. In many volumes of the Project considerable attention has been paid to Europe and, through Europe, to other parts of the world. For the purpose of a comprehensive cultural study of India, the existing political boundaries of the South Asia of today are more of a hindrance than help. Cultures, like languages, often transcend the bounds of changing political territories.

If the inconstant political geography is not a reliable help to the understanding of the layered structure and spread of culture, a somewhat comparable problem is encountered in the area of historical periodization. Periodization or segmenting time is a very tricky affair. When exactly one period ends and another begins is not precisely ascertainable. The periods of history designated as ancient, medieval and modern are purely conventional and merely heuristic in character. The varying scopes of history, local, national and continental or universal, somewhat like the periods of history, are unavoidably fuzzy and shifting. Amidst all these difficulties, the volume-wise details have been planned and worked out by the editors in consultation with the Project Director and the General Editor. I believe that the editors of different volumes have also profited from the reactions and suggestions of the contributors of individual chapters in planning the volumes.

Another aspect of Indian history which the volume editors and contributors of the Project have carefully dealt with is the distinction and relation between civilization and culture. The material conditions which substantially shaped Indian civilization have been discussed in detail. From agriculture and industry to metallurgy and technology, from physics and chemical practices to the life sciences and different systems of medicines—all the branches of knowledge and skill which directly affect human life—form the heart of this Project. Since the periods covered by the PHISPC are extensive—prehistory, proto-history, early history, medieval history and modern history of India—we do not claim to have gone into all the relevant material conditions of human life. We had to be selective. Therefore, one should not be surprised if one finds that only some material aspects of

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Indian civilization have received our pointed attention, while the rest have been dealt with in principle or only alluded to.

One of the main aims of the Project has been to spell out the first principles of the philosophy of different schools, both pro-Vedic and anti-Vedic. The basic ideas of Buddhism, Jainism and Islam have been given their due importance. The special position accorded to philosophy is to be understood partly in terms of its proclaimed unifying character and partly it is to be explained in terms of the fact that different philosophical systems represent alternative world-views, cultural perspectives, their conflict and mutual assimilation.

Most of the volume editors and at their instance the concerned contributors have followed a middle path between the extremes of narrativism and theoreticism. The underlying idea has been this: If in the process of working out a comprehensive Project like this every contributor attempts to narrate all those interesting things that he has in the back of his mind, the enterprise is likely to prove unmanageable. If, on the other hand, particular details are consciously forced into a fixed mould or pre-supposed theoretical structure, the details lose their particularity and interesting character. Therefore, depending on the nature of the problem of discourse, most of the writers have tried to reconcile in their presentation, the specificity of narrativism and the generality of theoretical orientation. This is a conscious editorial decision. Because, in the absence of a theory, however inarticulate it may be, the factual details tend to fall apart. Spiritual network or theoretical orientation makes historical details not only meaningful but also interesting and enjoyable.

Another editorial decision which deserves spelling out is the necessity or avoidability of duplication of the same theme in different volumes or even in the same volume. Certainly, this Project is not an assortment of several volumes. Nor is any volume intended to be a miscellany. This Project has been designed with a definite end in view and has a structure of its own. The character of the structure has admittedly been influenced by the variety of the themes accommodated within it. Again it must be understood that the complexity of structure is rooted in the aimed integrality of the Project itself.

IV

Long and in-depth editorial discussion has led us to several unanimous conclusions. Firstly, our Project is going to be *unique,* unrivalled and discursive in its attempt to integrate different forms of science, technology, philosophy and culture. Its comprehensive scope, continuous character and accent on culture distinguish it from the works of such Indian authors as P.C. Ray, B.N. Seal, Binoy Kumar Sarkar and S.N. Sen and also from such Euro-American writers as Lynn Thorndike, George Sarton and Joseph Needham. Indeed, it would be no exaggeration to suggest that it is for the first time that an endeavour of so comprehensive a character, in its exploration of the social, philosophical and cultural characteristics of a distinctive world civilization—that of India—has been attempted in the domain of scholarship.

Secondly, we try to show the linkages between different branches of learning as different modes of experience in an *organic* manner and without resorting to a kind of reductionism, materialistic or spiritualistic. The internal dialectics of organicism without reductionism allows fuzziness, discontinuity and discreteness within limits.

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Thirdly, positively speaking, different modes of human experience—scientific, artistic, etc. have their own individuality, not necessarily autonomy. Since all these modes are modification and articulation of *human* experience, these are bound to have between them some finely graded commonness. At the same time, it has been recognized that reflection on different areas of experience and investigation brings to light new insights and findings. Growth of knowledge requires humans, in general, and scholars, in particular, to identify the distinctness of different branches of learning.

Fourthly, to follow simultaneously the twin principles of: (a) individuality of human experience as a whole, and (b) individuality of diverse disciplines, are not at all an easy task. Overlap of themes and duplication of the terms of discourse become unavoidable at times. For example, in the context of *Dharmaśāstra*, the writer is bound to discuss the concept of value. The same concept also figures in economic discourse and also occurs in a discussion on fine arts. The conscious editorial decision has been that, while duplication should be kept to its minimum, for the sake of intended clarity of the themes under discussion, their reiteration must not be avoided at high intellectual cost.

Fifthly, the scholars working on the Project are drawn from widely different disciplines. They have brought to our notice an important fact that has clear relevance to our work. Many of our contemporary disciplines like economics and sociology did not exist, at least not in their present form, just two centuries ago or so. For example, before the middle of nineteenth century, sociology as a distinct branch of knowledge was unknown. The term is said to have been coined first by the French philosopher Auguste Comte in 1838. Obviously, this does not mean that the issues discussed in sociology were not there. Similarly, Adam Smith's (1723–90) famous work *The Wealth of Nations* is often referred to as the first authoritative statement of the principles of (what we now call) economics. Interestingly enough, the author was equally interested in ethics and jurisprudence. It is clear from history that the nature and scope of different disciplines undergo change, at times very radically, over time. For example, in India by *arthaśāstra* does not mean the science of economics as understood today. Besides the principles of economics, it discusses at length those of governance, diplomacy and military science.

Sixthly, this brings us to the next editorial policy followed in the Project. We have tried to remain very conscious of what may be called indeterminacy or inexactness of translation. When a word or expression of one language is translated into another, some loss of meaning or exactitude seems to be unavoidable. This is true not only in the bilingual relations like Sanskrit-English and Sanskrit-Arabic, but also in those of Hindi-Tamil and Hindi-Bengali. In recognition of the importance of language-bound and context-relative character of meaning we have solicited from many learned scholars, contributions, written in vernacular languages. In order to minimize the miseffect of semantic inexactitude we have solicited translational help of that type of bilingual scholars who know both English and the concerned vernacular language, Hindi, Tamil, Telegu, Bengali or Marathi.

Seventhly and finally, perhaps the place of technology as a branch of knowledge in the composite universe of science and art merits some elucidation. Technology has been conceived in very many ways, e.g. as autonomous, as 'standing reserve', as liberating or enlargemental, and alienative or estrangemental force. The studies undertaken by the Project show that, in spite of its much emphasized mechanical and alienative characteristics, technology embodies a very useful mode of knowledge that is peculiar to man. The Greek root words of technology are *techne* (art) and *logos* (science). This is the

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basic justification of recognizing technology as closely related to both epistemology, the discipline of valid knowledge, and axiology, the discipline of freedom and values. It is in this context that we are reminded of the definition of man as *homo technikos*. In Sanskrit, the word closest to *techne* is *kalā* which means any practical art, any mechanical or fine art. In the Indian tradition, in *Śaivatantra*, for example, among the arts (*kalā*) are counted dance, drama, music, architecture, metallurgy, knowledge of dictionary, encyclopaedia and prosody. The closeness of the relation between arts and sciences, technology and other forms of knowledge are evident from these examples and was known to the ancient people. The human quest for knowledge involves the use of both head and hand. Without mind, the body is a corpse and the disembodied mind is a bare abstraction. Even for our appreciation of what is beautiful and the creation of what is valuable, we are required to exercise both our intellectual competence and physical capacity. In a manner of speaking, one might rightly affirm that our psychosomatic structure is a functional connector between what we are and what we could be, between the physical and the beyond. To suppose that there is a clear-cut distinction between the physical world and the psychosomatic one amounts to denial of the possible emergence of higher logico-mathematical, musical and other capacities. The very availability of aesthetic experience and creation proves that the supposed distinction is somehow overcome by what may be called the bodily self or embodied mind.

V

The ways of classification of arts and sciences are neither universal nor permanent. In the Indian tradition, in the *Ṛgveda*, for example, *Vidyās* (or sciences) are said to be four in number: (i) *Trayī*, the triple Veda; (ii) *Ānvīkṣikī*, logic and metaphysics; (iii) *Daṇḍa-nīti*, science of governance; (iv) *Vārtta*, practical arts such as agriculture, commerce, medicine, etc. Manu speaks of a fifth *vidyā*, viz. *Ātma-vidyā*, knowledge of self or of spiritual truth. According to many others, *vidyā* has fourteen divisions, viz. the four *Vedas*, the six *Vedāṅgas*, the *Purāṇas*, the *Mīmāṁsā*, *Nyāya*, and *Dharma* or law. At times, the four *Upa-vedas* are also recognized by some as *vidyā*. *Kalās* are said to be 33 or even 64.

In the classical tradition of India, the word *Śāstra* has at times been used as synonym of *vidyā*. *Vidyā* denotes instrument of teaching, manual or compendium of rules, religious or scientific treatise. The word *Śāstra* is usually found after the word referring to the subject of the book, e.g., *Dharma-śāstra*, *Artha-śāstra*, *Alaṁkara-śāstra* and *Mokṣa-śāstra*. Two other words which have been frequently used to denote different branches of knowledge are *jñāna* and *vijñāna*. While *jñāna* means knowing, knowledge, especially the higher form of it; *vijñāna* stands for the act of distinguishing or discerning, understanding, comprehending and recognizing. It means worldly or profane knowledge as distinguished from *jñāna*, knowledge of the divine.

It must be said here that the division of knowledge is partly conventional and partly administrative or practical. It keeps on changing from culture to culture, from age to age. It is difficult to claim that the distinction between *jñāna* and *vijñāna* or that between science and art is universal. It is true that even before the advent of modern age, both in the East and the West, two basic aspects of sciences started gaining recognition. One is the *specialized character* of what we call scientific knowledge. The other is the concept of *trained skill* which was brought close to scientific knowledge. In the medieval Europe, the

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expression 'the seven liberal sciences' has so often been used simultaneously with 'the seven liberal arts', meaning thereby, the group of studies by the *Trivium* (Grammar, Logic and Rhetoric) and *Quadrivium* (Arithmetic, Music, Geometry and Astronomy).

It may be observed here, as has already been alluded to earlier, that the division between different branches of knowledge, between theory and practice, was not pushed to an extreme extent in the early ages. *Praxis*, for example, was recognized as the prime *techne*. The Greek word, *technologia* stood for systematic treatment, for example, of Grammar. *Praxis* is not the mere application of *theoria*, unified vision or integral outlook, but it also stands for the active impetus and base of knowledge. In India, one often uses the terms *Prayukti-vidyā* and *Prayodyogika-vidyā* to emphasize the practical or applicative character of knowledge. *Prayoga* or application is both the test and base of knowledge. Doing is the best way of knowing and learning.

That one and the same word may mean different 'things' or concepts in different cultures and thus create confusion has already been stated before. Two such words which in the context of this Project under discussion deserve special mention are *dharma* and *itihāsa*. Ordinarily, *dharma* in Sanskrit-rooted languages is taken to be conceptual equivalent of the English word *religion*. But, while the meaning of religion is primarily theological, that of *dharma* seems to be manifold. Literally, *dharma* stands for that which is established or that which holds people steadfastly together. Its other meanings are law, rule, usage, practice, custom, ordinance and statute. Spiritual or moral merit, virtue, righteousness and good works are also denoted by it. Further, *dharma* stands for natural qualities like burning (of fire), liquidity (of water) and fragility (of glass). Thus one finds that meanings of *dharma* are of many types—legal, social, moral, religious or spiritual, and even ontological or physical. All these meanings of *dharma* have received due attention of the writers in the relevant contexts of different volumes.

This Project, being primarily historical as it is, has naturally paid serious attention to the different concepts of history—epic-mythic, artistic-narrative, scientific-causal, theoretical and ideological. Perhaps the point that must be mentioned first about history is that it is not a correct translation of the Sanskrit word *itihāsa*. Etymologically, it means what really happened (*iti-ha-āsa*). But, as we know, in the Indian tradition *purāṇa* (legend, myth, tale, etc.), *gāthā* (ballad), *itivṛtta* (description of past occurrence, event, etc.), *ākhyāyikā* (short narrative) and *vaṃśa-carita* (genealogy) have been consciously accorded a very important place. Things started changing with the passage of time and particularly after the effective presence of Islamic culture in India. Islamic historians, because of their own cultural moorings and the influence of the Semitic and Graeco-Roman cultures on them, were more particular about their facts, figures and dates than their Indian predecessors. Their aim to bring history close to statecraft, social conditions and the lives and teachings of the religious leaders imparted a mundane character to this branch of learning. The Europeans whose political appearance on the Indian scene became quite perceptible only towards the end of the eighteenth century brought in with them their own view of historiography in their cultural baggage. The impact of the Newtonian Revolution in the field of history was very faithfully worked out, among others, by David Hume (1711–76) in *History of Great Britain from the Invasion of Julius Caesar to the Revolution of 1688* (6 vols., 1754–62) and Edward Gibbon (1737–94) in *The History of the Decline and Fall of the Roman Empire* (6 vols., 1776–88). Their emphasis on the principles of causality, datability and continuity/linearity of historical events introduced the spirit of scientific revolution in European historiography. The introduction

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of English education in India and the exposure of the elites of the country to it largely account for the decline of the traditional concept of *itihāsa* and the rise of the post-Newtonian scientific historiography. Gradually, Indian writers of our own history and cultural heritage started using more and more European concepts and categories. This is not to suggest that the impact of the European historiography on Indian historians was entirely negative. On the contrary, it imparted an analytical and critical temper which motivated many Indian historians of the nineteenth century to try to discover and represent our heritage in a new way.

VI

The principles which have been followed for organizing the subjects of different volumes under this Project may be stated in this way. We have kept in view the main structures which are discernible in the decomposible composition of the world. The first structure may be described as physical and chemical. The second structure consists, broadly speaking, of biology, psychology and epistemology. The highest and the most abstract structure nests many substructures within it, for example, logic, mathematics and musical notes. It is well known that the substructures within each structure are interactive, i.e. not isolable. The more important point to be noted in this connection is that the basic three structures of the world, viz., (a) physico-chemical, (b) bio-psychological, and (c) logico-mathematical are all simultaneously open to upward and downward causation. In other words, while the physico-chemical structure can causally influence the bio-psychological one and the latter can causally influence the most abstract logico-mathematical, the reverse process of causation is also operative in the world. In spite of its relative abstractness and durability, the logico-mathematical world has its downward causal impact on our bio-psychological and epistemological processes and products. And the latter can also bring about change in the structures of the physical world and its chemical composition. Applied physics and bio-technology make the last point abundantly clear.

Many philosophers, life-scientists, and social scientists highlight the point that nature loves hierarchies. Herbert Simon, the economist and the management scientist, speaks of four steps of partial ordering of our world, namely; (i) chemical substances, (ii) living organisms, tissues and organs, (iii) genes, chromosomes and DNA, and (iv) human beings, the social organizations, programmes and information process. All these views are in accord with the anti-reductionist character of our Project. Many biologists defend this approach by pointing out that certain characteristics of biological phenomena and process like unpredictability, randomness, uniqueness, magnitude of stochastic perturbations, complexity and emergence cannot be reduced without residue to physical laws.

The main subjects dealt with in different volumes of the Project are connected not only conceptually and synchronically but also historically or diachronically. For pressing practical reasons, however, we did not aim at presenting the prehistorical, proto-historical and historical past of India in a continuous or chronological manner. Besides, it has been shown in the presentation of the PHISPC that the process of history is non-linear. And this process is to be understood in terms of human praxis and an absence of general laws in history. Another point which deserves special mention is that the editorial advisors have taken a conscious decision not to make this historical Project primarily political. We felt that this area of history has always been receiving extensive attention. Therefore, the

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customary discussion of dynastic rule and succession will not be found in a prominent way in this series. Instead, as said before, most of the available space has been given to social, scientific, philosophical and other cultural aspects of Indian civilization.

Having stated this, it must be admitted that our departure from conventional style of writing Indian history is not total. We have followed an inarticulate framework of time in organizing and presenting the results of our studies. The first volume, together with its parts, deals with the prehistorical period to AD 300. The next two volumes, together with their parts, deal with, among other things, development of social and political institutions and philosophical and scientific ideas from AD 300 to the beginning of the eleventh century AD. The next period with which this Project is concerned spans from the twelfth century to the early part of the eighteenth century. The last three centuries constitute the fourth period covered by this Project. But, as said before, the definition of all these periods by their very nature are inexact and merely indicative.

Two other points must be mentioned before I conclude this General Introduction to the series. The history of some of the subjects like religion, language and literature, philosophy, science and technology cannot for obvious reason be squeezed within the cramped space of the periodic moulds. Attempts to do so result in thematic distortion. Therefore, the reader will often see the overflow of some ideas from one period to another. I have already drawn attention to this tricky and fuzzy and also the misleading aspects of the periodization of history, if pressed beyond a point.

Secondly, strictly speaking, history knows no end. Every age rewrites its history. Every generation, beset with new issues, problems and questions, looks back to its history and reinterprets and renews its past. This shows why history is not only contemporaneous but also futural. Human life actually knows no separative wall between its past, present and future. Its cognitive enterprises, moral endeavours and practical activities are informed of the past, oriented by the present and addressed to the future. This process persists, consciously or unconsciously, wittingly or unwittingly. In the narrative of this Project, we have tried to represent this complex and fascinating story of Indian civilization.

D.P. Chattopadhyaya
General Editor

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A Perspective

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The struggle for existence and the survival of the fittest that characterised the biological evolution leading to the emergence of man, were external and internal alike. The incessant human struggle, from pre-historic times to the present, for existence as a distinct biological species overcoming often the hostile environment on the one side and, on the other, the diseases that afflict him both externally and internally has been indeed a fascinating story. We do not know the measures adopted by wandering primitive man for curing his ailments. But, conceivably, he had developed some technique of healing perhaps by some method of trial and error or by observing the path followed instinctively by animals which, when afflicted, would find succour in some plants. We are also in the dark about the nature of medical practices of the neolithic age when man began to lead a settled life. The picture is somewhat more clear with the ancient civilizations, of which Egypt was the oldest.

Medicine and superstitious teleology were two-in-one among the Egyptian priests. Divine Osiris and his wife Isis (raised to the level of a goddess), were regarded by Egyptians not only as the inventors of the healing art, but also as the custodians of the health of mankind. Egyptian medicine had two dimensions: one which was theurgic, and the other, the actual practices of a physician. In respect of the former, the priest-magicians were largely involved in offering magical cures and charms in temples. In the case of the latter, ordinary priests employed some natural curative measures, mostly plant products. Since each physician was expected to be a specialist in curing one disease only, there were ocultists, dentists and the like. Embalming the dead body was an accomplished art. In any case Egyptian medicine was essentially a belief system. It was believed that there were thirty six gods of the atmosphere and thirty six 'demons', and the human body was conceptually divided into as many parts. If a particular part of the body was affected, the concerned 'demon' had to be invoked for its cure. The concept of disease-demons was very strong among Egyptians. Though plant medicaments were in use, they were not considered to be efficacious without the appeasement of 'demons' through magical rites. Some Egyptian medical papyri preserved in the museums in Europe, provide several details about the medicinal herbs and the adjuvants like milk, honey, salt and fermented

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liquor on the one hand and, on the other, magical invocations, amulets and other curative devices. It was also a practice to bury the dead along with their amulets as a bulwark against the evil influences of the other world. The 'Medical Papyrus' preserved in Berlin Museum is somewhat of an encyclopedia of medicine and provides details of a large number of prescriptions that were in vogue among Egyptians of the eighteenth dynasty—herbs and other preparations for the cure of tumours of the breast, bites, cuts, and other ailments. Administration of medicine, use of charms, or any other magical remedy was to be done on an auspicions day determined by the priests who were also the calendar-makers. Egyptian physicians who had evolved a materia medica and therapeutic interventions depending upon the nature of disease were sought after by the Persian kings.

The Jews who resided in Egypt for generations, obviously owed their healing practices to Egyptians. Among them too, priests were the physicians. In the Jewish text, *Talmud,* there are expressions indicating that a physician had divine permission to treat diseases since it was believed that both the disease and its cure lay in the hands of god. It is interesting to note that a Jewish physician also came to be known as Hakim, a term used later by Arabs for their physicians. Significantly, Jewish physicians used amulets and incantations to a lesser degree, and relied more on natural methods. They were held in high esteem by their society, and the cure of the sick was considered as a meritorious act. Jewish medical practices were also twofold—preventive and curative—with the attitude that a physician does not actually cure a disease, but merely prepares the ground for nature which is the actual healer.

In Mesopotamia, as in Egypt, the medical practices of Akkadians, Babylonians, Assyrians and Chaldeans were concerned with the warding off evil spirits or 'disease-demons', and the priests were the custodians of magic formulae, charms and talismans. Exorcism of 'disease-demon' was a common remedial practice. The Jews also incorporated into their medical treatment several of the Babylonian and Chaldean practices.

GREEK MEDICINE

In the early Greek civilizational settlements, Apollo, the Sun-God, was considered to be the protector of mankind from attacks of epidemics like plague. The main healing deity, Cheiron, the centaur, according to the Greek epic, the *Iliad*, received instructions from Apollo. In turn, he imparted the art of healing to Aesculapius who was regarded as the son of Apollo himself, and as representing *Air* while Apollo represented *Sun*. Soon it was Aesculapius who became the popular god of medicine. The now familiar symbol of the serpent entwined around the rod of Aesculapius denoted the idea that serpents can renovate themselves and have the capacity of finding out the healing power of plants. The story is that when Aesculapius was in a pensive mood curing a patient, a serpent came and twined itself round his staff. It killed the serpent whereupon another serpent appeared with a herb in its mouth and restored the dead serpent to life. Aesculapius was a successful physician and hence the Greeks raised him to the level of a divinity, building temples for him in the hilly and healthy regions. The tradition of healing by visiting the

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temples of Aesculapius became popular and deep-rooted in the Greek society around 1200 B.C. Among the sons and daughters of Aesculapius were Hygeia (the goddess of health) and Panacea (the all-healer)-the words that are still with us as hygiene and panacea, along with the symbol of the rod with entwined snakes. A personified deity in a temple emerged as the healer par excellence. Sick persons, therefore, visited temples of Aesculapius, offered prayers and animal sacrifices to him, and slept on the skin of the slain animal, while the priests conducted rites on the sick and administered medicines to them prescribing a proper diet and rules of conduct. It was in essence a faith cure and the temple-healing acquired some credibility because the successful cases were carved on the temple walls. The healers were called Asclepiads. There was also the practice of offering symbolically models of the afflicted part of the body of a patient made from metals like gold and silver—a practice we notice even today in India in some temples. The nomenclature, Greek medicine, is not due to the Asclepiads but owes it origin to the new mode of thinking and practice that came up among Ionian philosophers and, more importantly, to what is generally known as the Hippocratic method.

The early Greek (pre-Socratic) thinkers (c. 6th-5th century *B.C*) attempted to explain the diverse phenomenal world of matter, qualities and motion in terms of a single principle or substance. Thales of Miletus (c.6th century *B.C*) thought that 'water' was the 'substance' or primal matter that would remain basically unchanged amidst all the observed diverse phenomena. His unitary conception stimulated others to think on similar lines. Anaximander, his contemporary, believed in the undifferentiated, infinite and eternal matter in motion *(aperion)*. Another philosopher, Anaximenes specified the idea of Anaximander by postulating the first principle as 'air' *(pneuma)*. He also speculated on the transformations of the primary matter into various forms through the processes of rarefaction or condensation. Heracleitus of Ephesus regarded 'fire' as the fundamental principle and held that the whole world was in a flux of change, and change alone was real, 'fire' being an embodiment of such a change. The Sicilian philosopher, Empedocles propounded that 'earth' was also a basic principle and tried to explain the multiplicity of phenomena in terms of earth, water, air, and fire calling them the 'roots of the world'. He also introduced the idea of force (love and strife) which would be perpetually acting on these 'roots'. He went a step further and developed a theory of four elements: *earth, fire, water* and *air*, and the four primary qualities: *hot, cold, dry* and *moist*. The problem of change was also explained on the basis of these pairs of opposite attributes. The primary matter would become *earth* with the pair of primary qualities *cold* and *dry; water*, with *cold* and *wet; fire,* with *hot* and *dry;* and *air*, with *hot* and *wet.*

The Empedoclean theory, however speculative it was, heralded the dawn of a new thinking on the physical world in contradistinction to the varied mythological explanations which had swayed the human mind till then. About a century earlier, there was the school of Pythagoras (at Croton in South Italy) which believed in number mysticism, but had also advocated a disciplined dietary system for the maintenance of health. A younger contemporary of Pythagoras, Alcmaeon of Croton had enunciated the idea of physiological balance or harmony of the elements. He introduced the concept that disease was the preponderance (*monarchia)* of any one of the elements over the others. He is also stated

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to have conducted dissection of animals and from his anatomical knowledge so obtained, to have pointed out that the brain is the centre of the intellect. However, none of the pre-Socratic philosophers ever thought in terms of the basic unity of man and nature, of microcosm and macrocosm in the context of health and disease.

Man as a biological entity and as an integral part of the biology of nature demanded a new understanding and a new insight into his healthy living. This was the approach of Hippocrates (b.430 *B.C.*) of Cos (an Aegean island) who came from a family of priest-physicians or Asclepiads. In the Greek-speaking cities and islands, there were at least two schools of medicine—one of Hippocrates at Cos, and the other at Cnidus. Hippocrates was closely associated with Cos, its being his birthplace. The general approach at Cos was the insistence on prognosis and to think of a patient's disease as a natural process of abnormality, while at Cnidus, stress was laid on diagnosis and the observation of external manifestations. Not much is known about the personal life of Hippocrates nor of his writings. However, a body of writings cumulatively called the *Corpus Hippocraticum* is attributed to this physician who exerted a tremendous influence on the future course of medicine by his scientific approach to diseases and their cure, which is generally known as the 'Hippocratic method'. To Hippocrates, the life-process meant the constant interaction between the individual and nature or the environment. Though he might not be regarded as the founder of the Greek humoural concept, he developed the classical theory of Greek medicine—the four humours—blood, phlegm, yellow bile and black bile. In tune with the Empedoclean theory of *four* elements, the various body-fluids were also perceived under these four 'humours'. According to Hippocrates, health in the body meant the interplay of proper proportions of the four humours and when one or the other would be in excess, abnormality would result. In certain people there would be a natural tendency towards having one or the other humour in excess leading to their difference in temperaments (sanguinous, phlegmatic, bilious, and melancholic). Hippocrates also thought that the body or organism in a majority of cases would be able to counteract or solve by itself the harmful effects of a disease, and only when the condition deteriorates, should a physician step in. Two groups of causative factors were recognized in Hippocratic medicine: (i) the vitiation of natural dispositions or temperaments; and (ii) improper environmental conditions, food and drink. A third group was also recognized in relation to an individual's own habits, actions or functions. Hippocrates and his followers were careful observers and believed in recording actual observations as well as in the systematic examination of a patient. In general, they did not think of a sharp divide between the normal and pathological states, but viewed the disease state as one which would have more incapability to overcome the harmful environment. Hippocrates rightly stressed the importance of climate vis-a-vis the physiological and pathological states. The teachings of Hippocrates and the works of his followers became an unassailable canon of medicine in the succeeding centuries, fortified with reasoning (*logos*) and setting aside supernatural beliefs (*mythos*).

The Greek intellectual giant and philosopher, Plato (427—347 *B.C*) was a contemporary of Hippocrates. His two texts, *Timaeus* and *Phaedo,* deal with some medical aspects, though in a figurative language. There is evidence to indicate that there was some communication between Greece and India, even before the invasion by Alexander

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the Great, the pathway bring the Achemenian Persians (Filliozat, pp.229—57). The medical tracts like '*On the Nature of Child*', '*On the Embryo of Eight Months*', '*On Flesh*' and '*On Diet in Acute Cases*' contain some ideas which could well have been those of Ayurveda. The Ayurvedic use of dry *pippalī* (long pepper) in curing eye diseases appears to have been known to the Greek physicians as evidenced by its usage which has been recorded in the manual, *On Women's Diseases*. Plato in his *Timaeus* has mentioned a class of diseases due to *pneuma, phlegm* and *bile*, though in a rudimentary manner. His account of the pathogeny of ailments due to wind is somewhat in accordance with the Ayurvedic *vāta*. Moreover, according to Filliozat (p.232): 'The theory of phlegm in Plato is quite similar to that of the *śleṣman* of Indian doctors... Concerning the 'hot and liquid' nature of the bile, Plato agrees fully with the old Vedic idea of the igneous nature of the bile, an idea inherited by Ayurvedic medicine.... The explanation of certain diseases by the irruption of bile in blood is common to Plato and Indian doctors who call this accident *rakta-pitta* (blood-bile; *Suśruta, Uttara tantra*, XIV)... The fevers enumerated by Plato, while finishing his exposition concerning the diseases of the body, are well known in India not only to doctors, but even to the authors of the magical conjurations of the *Atharvaveda*... One should also count the belief of Plato in metempsychosis and his theory of vision among the concordances of his ideas with those of India... The interpretation of all these concordances between the doctrines of *Timaeus* and those of the physiologists, indeed the mystics, of India is delicate... Noted at a time when it was readily believed that Plato had reproduced the ideas of the so-called Pythagorean *Timaeus* and that Pythagoras had known the ideas of India, these concordances could have been easily considered as the witness of the dependence of Pythagorism and Plato on India. But today, although the question of the eventual relationship of Pythagoras has never been seriously settled, this question cannot be settled with equal ease'.

Plato's pupil, Aristotle (who in turn was a tutor of the young Alexander the Great) was a biologist. He attached great importance to the heart and vascular system. A vitalist and teleologist, Aristotle believed in an essential principle that would manifest itself as the phenomena of life and their integration leading to a perfect and harmonious individual. He also visualized the universe (geocentric) in his own way, which had its impact on Europeam astronomers for over 1700 years till the arrival of Copernicus, Kepler, Galileo and Newton. Though Aristotle was the son of a physician, he did not write on medical subjects, but was keenly interested in anatomy.

In the first century A.D., what was known as the School of the Pneumatics emerged which emphasised the importance of pneuma or vital air as the primal principle of an organism. This School did not subscribe to Hippocratic humours, but developed an explanation of the physiological processes in terms of natural and psychic pneuma as well as an involved pulse mechanism.

The second century A.D. witnessed the appearance of a medical-encyclopedist, Galen of Pergamum (in Asia Minor). A Greek by birth, he spent his active life in Rome, though he was forced to leave Rome later because of professional intrigues. He held Hippocrates in high esteem and enriched Greek medicine with his own clinical, anatomical and physiological investigations. It was Galen who elucidated the *physis* (living organism) of

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Hippocrates in terms of an internally pervasive, creative essence that would sustain the organism. More importantly, one of his main expositions was that a spirit pneuma drawn inside by the act of breathing was responsible for the various faculties of the physis. Galen's physiology encompassed what he called the 'natural spirit' (in the liver); vital spirit (in the heart); and 'animal spirit' (in the brain) as well as the pneuma and its circulation in the body. He thought that the liver was the centre of the venous blood system. His teleology that the anatomical structure and functions were the Creator's design received the approval of the Church. It was, therefore, Galen, more than Hippocrates, who greatly influenced the European medicine for nearly twelve centuries. Before him Aristotelian teleology and his conception of a geocentric universe had also received later the approval of the Church for their social acceptability. In India such a concurrence of a religious authority was never sought, especially for Ayurveda. One common feature, however, was that medicine remained in a way free from any type of the royal or legislative dominance both in the Greco-Roman Empire and in India. It may be noted that the *Corpus Hippocraticum* contains several divergent views on certain medical problems, both rational and empirical. It was the Hippocratic oath, 'swearing by Apollo, the Healer and by Aesculapius, by Hygeia and Panacea and by all the gods and goddesses for the benefit of the sick' devoid of all intentional injustice or wrong doing' that stood always before a physician in Europe, like an Ayurvedic vaidya who had to observe his professional ethics. As in India, in the Greco-Roman world too, medical education was a private affair from a master to his disciples. The Hippocratic Oath included: 'I will reckon him (preceptor) who taught me this Art (medicine) as dear to me as those who bore me. I will look upon his offspring as my own brethren and will teach them this Art, if they would learn it, without fee or stipulation. By precept, lecture and every mode of instruction, I will impart a knowledge of this Art to my own sons, and to those of my teacher and to disciples bound by a stipualtion and oath, according to the Law of Medicine, but to none other'. (Singer, p.106)

But imperial Rome had its own laws of medical service especially with regard to public health. Sanitation was an important feature of Roman life including subterranean sewers, cleaning the streets and the distribution of potable water. Rome had also a public medical service specially to attend to the needs of the poor, and a hospital system which was perhaps initially connected with the Roman military system. Later military hospitals were established at important strategic places. In the succeeding centuries, the humanitarian tradition of founding hospitals reached a new home, the area of Islamic culture.

GRECO-ARABIC MEDICINE

Apart from several treatises dealing with what is called Prophetic Medicine, the authors of which were generally the clerics engaged in the traditional (*hadīth*) medical practices during the time of the Prophet, the *Kitab al-Hawi fi al-tibb* (The Comprehensive Book on Medicine) by Abū Bakr Muhmad ibn Zakarīyā Razī (865—925 *A.D.*) was an important landmark of Islamic medical literature. Known to medieval Europe as the *Liber continens*,

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al-Razi's treatise was a standard reference medical compendium. Born in the Iranian city of Rayy, al-Razī (also called Rhazes by Latin writers) headed hospitals both in his home town and later in Baghdad. He incorporated into his extensive treatise the medical ideas and practices of earlier noted physicians as well as some Ayurvedic sources. He is regarded as the first to describe smallpox and measles in a scientific manner.

After a critical examination of the writings of Hippocrates, of Galen and al-Razī, al-Majūsī of a Zorastrian family from Ahwaz (in Iran) served as a physician to the ruler and founder of the Adudi hospital in Baghdad. Al-Majūsī's *Kitāb Kamil al-ṣinā ah al-ṭibbīyah* (The Complete Book of the Medical Art) was a systematized medical compendium in two parts: one on the theoretical principles, and the other dealing with practical aspects. In Europe, it was known as *Liber regins* or *Pantegni*. Al-Zahrāwī, a contemporary of al-Majūsī, produced a medical treatise, the final section of which was devoted to surgery. There were other Islamic physicians both in the eastern and western parts who improved upon Greco-Roman medicine. But, among them the most prominent was Abū 'Alī al-Husayn ibn 'Abd Allāh ibn Sīnā (980-1037 A.D) of Central Asia (near Bukhara in Uzbekistan). Known as Avicenna in Europe, ibn Sīnā emerged as an authority on Islamic (Greco–Arabic) medicine and his treatise *Kitāb al-Qānun fī al-ṭibb)* or *Canon of Medicine* influenced not only Europe but also medieval India. Ibn Sīnā and his text continue to be the authorities of Unani medicine in India. Islamic physicians made notable contributions to rational medicine, ophthalmology, anatomy, surgery as well as pharmaceutics, and enriched the medical literature through their writings, many of which are still extant.

The most significant dimension of Greco-Arabic medicine in the Islamic world was the establishment of a number of hospitals which were far better than the earlier ones in the Greco-Roman empire. They were indeed secular medical institutions catering to the sick regardless of their religion or status. Known as *bimāristān* (place for sick persons), the hospitals dotted practically all the urban centres of the Islamic world, from the eighth century onwards, as the centres of healing the sick and providing free diet to them, since they were financed by the rulers, wealthy men and rich religious trusts. Sometimes even a small stipend used to be given to needy patients after their discharge from the hospital. Islam as a religion emphasized such moral and humanitarian acts.

CHINESE MEDICINE

In the far-East, the Chinese had developed a vibrant medical thought and practice in their own characteristic way. In the earlier stages, around the 14th or 13th century B.C., in the Shang dynasty, the curse of the dead ancestors was believed to be the cause of ailments and they were to be appeased by offerings, prayers and incantations. The Shang culture did not believe in any pharmacology *per se*. Sorcerers were held in esteem because it was thought that they would be the communicators with the spirits of the dead. In course of time, the 'ancestral medicine' yielded place to 'demonic medicine' as a healing practice. In this process the use of the Confucian ideology and the Taoists' esoteric principles and practices came to the fore, and a new healing system gradually developed in the context of the social and political changes that took place from time to time. Even so, the

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remnants of 'demonic medicine' did not lose their relevance as they were also in practice. But, healing by the use of drugs and a systematic materia medica were by and large confined to Taoists who had their own speculations. Among them, from the point of view of Chinese medicine, the *yin-yang* theory, the five elements and what was called *Qi*, deserve special mention. Taoists also believed in alchemy. As a result, mercury and its compounds, sulphur, arsenical substances, mica and others also found their way into Chinese medicine, though for realizing some esoteric goals like attaining immortailty or a state of 'deathlessness'.

Chinese physiology, pathology and therapy were eventually related to *yin-yang*. Though the concept of *yin-yang* could be traced to the Chinese 'Book of Changes' (c. 7th century B.C), a few centuries later the *ying-yang* school of philosophy, a naturalist one, tried to interpret nature and its phenomena, including the human body, and its states of health or disease. According to Taoists, *yin* and *yang* would undergo inter-transformation depending upon the internal conditons as well as time. Each part or organ of the human body had a predominance of either *yin* or *yang*. The former was believed to correspond to the structure of the body and its parts, while the latter was concerned with functions or activities. They were also believed to be in a perpetual state of change or modification; but when one increased, the other would decrease so as to maintain the balance from the physiological or pathological point of view.

The Chinese theory of five 'elements' and the concept of *yin-yang* constitute in a way the foundation of Chinese medicine. While there is some similarity between the *Greek* and the Indian postulates of five 'elements', the Chinese 'elements' are at variance with either of them.

The Chinese five 'elements' are Water, Fire, Wood, Metal and Earth. It may be noted that the all pervading and vital to life, element Air, is not included in this concept, while it is a dynamic concept in Ayurveda (*vāyu, vāta)* and the Greek or Greco-Roman (*pneuma)* medicine. The Chinese, however, had postulated a sixth 'element' which was associated with heaven or the atmosphere (6 climates). The 'elements' of the Chinese were symbolic of some inherent qualities, natural phenomenal states, movements and even phases of seasonal cycle. They had also political implications in the sense that a ruler was linked with one of the 'elements', and his ceremonial function had to conform to the attributes of that element. The five 'elements' were not also devoid of numerological aspects. In physiology, they were stated to be intimately involved in (i) a generating sequence (*wood* generating *fire* and itself being generated by *water*; they were also related to liver, heart and kidneys), and (ii) a governing one, in the context of several auto-regulatory and balancing physiological processes. In diagnosis too the five-elemental postulate was employed in relation to qualities like colour, taste, sound and smell. Chinese herbal therapy along with a carefully worked out dietary regimen was also based on the five 'elements'. Pulse examination was another important diagnositc tool. Acupuncture involving vital centres was a speciality of Chinese treatment.

The activities of body and mind, according to the Chinese, go on because of the interaction of certain substances of vital character, which are a manifestation of what is called *Qi*, a primal entity, both material (body) and non-material (mind), gross and

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subtle. In its material aspects, *Qi* lies at the bottom of all the observed phenomena and their degrees of aggregation and dispersion. *Qi* was, therefore, a basic concept of Chinese philosophy and through it of its medicine inasmuch as it explained the inter-relatedness between the universe and man (microcosm and microcosm), the natural force outside and the physiological processes inside. *Qi* was also in the nature of **one** becoming **many** with its diverse forms, rarefaction, condensation and other functions including nourishment, circulation, reproduction and growth. In short, *Qi* was regarded as the very essence of organic functions. In the Chinese medical texts it had an important place as it sought to explain the various physiological transformations, circulation in general, transportation of body fluids and pathological states.

In the beginning of the first millenium A.D., there were three principal systems of medicine: Ayurveda, Greek, and Chinese medicine. Their fundamental attitude to the relationship of man and nature was more or less the same but their explanations of the human body and its physiology, pathology and therapy differed in some ways. Of the three ancient systems of medicine, it would appear that Ayurveda emerged as a remarkable holistic system both in its foundational ideas and therapeutic measures in a systematic manner.

MEDICINE IN INDIA

The Indus Valley Civilization or the Harappa Culture, as the archaeologists choose to call it, encompassed an area of nearly 1.3 million sq. km. extending far beyond the confines of the Indus Valley in all directions. Several hundreds of settlements, both urban and rural, of this civilization have come to light, and Mohenjo-Daro, Harappa, Chanhudaro, Lothal and Kalibangan were among its most important cities. They were known for their techniques in copper-bronze workmanship, bead-making, standardized bricks, spinning and weaving as well as agricultural production and management. More importantly, their town-planning was not only geometrical with well laid streets and lanes but also domestically functional with well constructed homes and interlocked drainages — an admirable endeavour of sanitation even about five thousand years ago. At the community level at Mohenjo-Daro was what the archaelogists call the Great Bath which was rectangular in shape, measuring about 12m (north to south) and 7m (east to west), its depth being 2.5m. It had several bathrooms with effective arrangements for the supply of water. Perhaps it related to the religions life of the people.

Apart from the sanitary system and hydropathic establishments like the Great Bath, there is little or no material information available about the medicare of the people of this civilization either archaeologically or in the literature. The so-called Indus script found on about 3000 seals, sealings and other inscribed objects has remained still undeciphered and we continue to be in the dark with regard to the thoughts of Harappans, be they of astronomy, mathematics, medicine or biological sciences. Nevertheless, in view of their town-planning and urban life, they would have developed a medicinal system similar to that of Mesopotamia or Babylonia with which they had established commercial contacts. Perhaps, the Harappan medicinal system would have been in some respects even superior

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to that of the latter because of the advanced lifestyle of Harappans and the absence in Babylonia of the type of Harappan drainage system or the Great Bath. In any case, Harappa Culture flourished between c. 2750—1900 B.C and passed through a decadent phase between 1900 and 1600 B.C. There is no unanimity among archaeologists with regard to the ultimate fate of this enchanting culture. Perhaps it might have diffused into the other settlements that came up later in India.

Whether Harappans practised trepanation, the ancient magically based primitive surgical technique to 'drive out evil spirits' supposed to be hidden in the brain by making holes through the skull bone for such 'spirits' to escape, is a moot point. There is, nevertheless, a view that two skulls found at Harappa have one hole each made in the temporo-parietal region, and the skull of a child at Kalibangan has three small holes on the right side of the skull through the squamous temporal bone above the right acoustic meatus. Possibly, the surgical operation might have been performed with a sharp hot iron piece. It should be noted, however, that there is no clear allusion to trepanation in the Ayurvedic texts.

Vedic Cult

The story, however, is different from about 1500 B.C. in the Indian subcontinent. The literary compositions, known as the four Vedas (the *Ṛgveda, Yajurveda, Sāmaveda and Atharvaveda*), their *Brāhmaṇas, Āraṇyakas and Upaniṣads*, (though they were transmitted orally for a long time through the preceptor-disciple relationship), provide an insight into the thoughts of Vedic seers encompassing man and nature, the 'inner' and the 'external' man. That the microcosm is a recapitulation of macrocosm and that man has to live in harmony with nature were the seminal concepts of Vedic people. The human body and its ailments too were conceived in terms of the propitiation of nature through its imagined diverse forms of gods and goddesses. Till about the 7th century B.C., there were no urban settlements of the type of the Harappa Culture. The Vedic settlements were confined to the lush green regions of the rivers in the north western part of India. The surrounding nature in general and a variety of flora in particular had an irresistible appeal to them, with the result that there emerged a symbiotic relationship between the Vedic people, especially the priests, and the plant kingdom. Whenever they suffered from diseases they looked up to plants in veneration for the alleviation of their diseases.

The Vedic pantheon was an extensive ensemble of divinities, and gods were also invoked for curing diseases. Plants, gods, and the sick became inseparable in the healing process of which the priestly class were the custodians. The appeasement of the wrath of gods, eulogies to the medicinally beneficial plants and magico-religious prayers, spells and incantations of *mantras* were intertwined by the three categories of priests—the Atharvans, Angiras and Bhṛgus who were supposed to be the authors or compilers of the *Atharvaveda* (c. 1000 B.C.). Of the four Vedas, the *Atharvaveda* is a repository of what may be called the magico-religious medicine as an integral part of fire-cult. During that period a parallel cult, known as the Soma-cult in which soma, the divine plant of healing or the 'herb of immortality', was accorded a special status. It was believed that the soma

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juice, if offered as an oblation to the fire (*agni*), would confer immortality upon the fire, and this would in turn be most beneficial to human life. In any case, in the thought-structure of the *Atharvaveda* as well as its complex practices, fire (*agni*) and soma were two sides of the same magico-religious coin that reflected the intense desire of the Vedic people, especially the priestly class, not only to be cured of the debilitating diseases but also of attaining immortality, a goal ever in sight but never attained by them. The soma-cult of immortality appeared in an entirely new form in the *rasaśāstra* to which we shall return later.

The fact that several diseases ranging from glandular boils to epilepsy, from dropsy to several types of fever with their pathogenic aspects, were known to the Vedic people reveals the careful observation of the diseases by the priests. But their cures were expectedly on primitive lines—the magic power of amulets, 'expulsion' of disease-causing demons through propitiation and exorcism, 'trapping' the disease demon by an offering to fire surrounded by a ditch filled with hot water, ceremonial offering or sprinkling of water after uttering the so-called curative *mantras* to it, incantations and invocations to a god or gods who were supposed to be specificially beneficial for curing a particular disease. For example, Maruts were propitiated for curing leprosy; sun-god, for curing heart and eye-diseases as well as jaundice; and Rudra, for overcoming colic fever and tuberculosis.

An important aspect of Vedic medicine was the use of certain plants as amulets, apart from their use either in the form of decoctions or powders or fumigant as medicines. A plant called *jangiḍa* (perhaps *Terminalia arjuna*) was regarded as having miraculous curative powers and was also used as an amulet; *apāmārga (Achyrenthus aspera)* was another plant used for curing what were called the hereditary diseases and for increasing fertility; *varaṇa* (*Craeteva roxburghii*) perhaps a tree, a part of which was used as an amulet as well as for curing wasting disease like tuberculosis. In any case Vedic medicinal practices were associated with rather an elaborate ritual which varied according to the nature of a disease. Proper rites, recitation of *mantras* with the prescribed intonation accompained by magical acts, sometimes of a grotesque nature, were as important as the plants chosen for curing 'disease-demons'. There was another aspect of healing rites which was related to a symbolically or sympathetically imagined curative practice. To illustrate: fever (*takman*) which was supposed to be caused by a demon was sought to be alleviated by binding a frog with a red as well as a blue thread to the bed on which the patient was made to lie down and water was sprinkled on him with incantations. The heat of the fever or the shivering accompanied in certain cases of fever was supposed to be transferred to the cold frog in a homoeopathic manner. Such healing practices involving frogs were also prevalent in Europe. Curative techniques of a magical nature included spells (word power) in which the *Atharvaveda* abounds, but with the use of chosen plants. The *kuṣṭha* plant was invoked with a magical rite to drive out the demon of fever; likewise, along with plants like *arundhati* (?) it was implored in the form of a spell to ward off an eye-disease believed to have been inflicted by a female demon. *Añjana* (naturally occurring antimony compound) and antelope horn were the remedial substances, along with spells, for driving out certain diseases.

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If the foregoing are regarded as irrational curative practices found in the *Atharvaveda*, although sometimes they might have borne fruit in bringing succour to the afflicted, this religious and occultist text is not devoid of some rational ideas about disease. A verse in the *Atharvaveda* explicity states that a disease may be caused by one of the three natural factors—*abhraja* (from clouds or moisture); *vātaja* (from wind); and *suṣmaja* (from desiccation) has been termed as *pitta*. The Ṛgveda also refers to *tridhātu*; *samavaratam*; but it is doubtful whether it was used in the same sense of three humours like the Ayurvedic texts, although Sāyāṇācārya, the most reliable Vedic commentator (14th century. A.D.) explains *tridhātu* as connoting the 'well-being of the three bodily elements'— a connotation accepted by some western scholars like Wilson, Cordier and Braunet, while others like Reinbold Muller and J. Filliozat do not favour it.

Both the *Ṛgveda* and the *Atharvaveda* point out that diseases are caused by congenital factors (*kṣetriya*), infection, seasonal change, or by minute organisms or insects (*kṛmi*) residing in the body. The *Atharvaveda* recommended that surgical operation should be carried out to remove imbedded arrows. There are also references in the *Atharvaveda* to the treatment of fractures and the possible use of a reed as a catheter to relieve blocked urinary tract. That the physical body is prone to decay ultimately meeting its death, was not only realized but also attempts were made by Vedic physicians to prolong its life through preventive and health-promoting measures in which hygiene and a balanced diet were accorded a special position. Despite some progressive ideas such as these, the Vedic people appeared to have been obsessed with magico-religious rites for the appeasement of gods and goddesses of their imagination for the redressal of their diverse woes including ailments that seized them from time to time. Such an obsession, in the succeeding 4 or 5 centuries, became a recessive gene, as it were, with the emergence of the 'inward quest' of the upaniṣads and the systematization of religio-philosophical thought-structures like the Sāṅkhya, Vaiśeṣika, and Nyāya and the doctrine of five elements (*pañcamahābhūtas)* that were as their integral component.

Five Elements

The *Ṛgveda* had laid the foundation for a unitary principle that would manifest itself in different forms in its endeavour to discover the energetic essence that lay amidst all the manifestations. The unmanifested cosmic energy (*sat*), the manifested cosmic light (*viśvajyoti*) of which the Vedic gods and their functional attributes were immanent, and the cosmic order (*ṛta*) or natural law which even the gods had to follow, signalised the Ṛgvedic approach towards understanding the unitary principle. The upaniṣads like the *Bhṛadāraṇyaka*, *Chāndogya*, *Kauśītakī*, *Taittirīya*, *Muṇḍaka* and *Praśna*, in their 'inward quest' towards *Brahman*, or the unitary cosmic principle, pure and sublime, also projected *Brahman* as 'Infinite Light and the Self-luminous Light'. Nevertheless, to understand the apparently unordered, pluralistic observed world of matter, motion and other attributes of varied nature, the upaniṣadic preceptors also formulated a new approach, eventually leading to the doctrine of five elements (*pañcabhūtas* or *pañcamahābhūtas*) which, though pluralistic in its structure, was holistic in nature.

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The five elements, *pṛthvī, ap, tejas, vāyu* and *ākāśa*, may be understood in terms of English words, *Earth, Water, Fire, Air* and a ubiquitous substance called *Ākāśa*; but they would not be the exact equivalents inasmuch as the respective Sanskrit words have a much wider connotation in their concept and application than their translated words in English. It may be noted that the Greeks also had postulated a theory of five elements — four (Earth, Water, Fire and Air of Empedocles) and the fifth (*ether* of Aristotle). *Ākāśa* of the Indian doctrine of five elements was conceived as an omnipresent element and a principle of the auditory organ, its specific quality being sound; (it would be wrong to equate *ākāśa* with Aristotelian *ether*). The other four elements, *pṛthvī, ap, tejas* and *vāyu* were also associated with the specific attributes of smell, taste, colour and touch respectively, unlike the Greek elements. More importantly, the Indian five elements were related to the five sense organs — nose (*pṛthvī*), tongue (*ap*), eyes, (*tejas*), skin (*vāyu*) and ears (*ākāśa*), the gateways of human perceptions and knowledge, unlike the Greek postulate.

Be that as it may, the fivefold character of the *pañcamahābhūtas* should be understood and viewed in its totality. In other words, in *pṛthvī*, the other four elements would also be present, but in less proportion; similarly *ap, tejas, vāyu* and *ākāśa*.

The doctrine of five elements gradually assumed its pluralistic but composite form in the *upaniṣads* (the *Kauśītakī, Chāndogya, Aitareya, Taittirīya* and others) towards a progressive understanding of *Brahman*, from the gross to the sublime infinite. The *Maitrī upaniṣad* states: 'the three-quartered *Brahman* has its roots above, its branches are *ākāśa, vāyu, tejas, ap* and *pṛthvī*.' Of relevance to us is the fact that the five elements generated several foundational ideas of Ayurveda. But they could do so only after they were integrated with viable religio-philosopical systems (*darśanas*) along with a comprehensive view of man vis-a-vis nature as well as the nature of man himself.

Systematisation : Development of Ayurveda

During the 6th—4th century B.C., the upaniṣadic fervour provided a fillip to a systematization of a spectrum of new ideas that were floating around that time. The relation between man and nature, between man and the observed material world, the methodology needed for a knowledge of the phenomenal world and the elevation of human mind with a control over the senses, were succinctly delineated in the form of the *Sāṅkhya, Vaiśeṣika, Nyāya* and *Yoga* systems. Alongside, two other systems—the *Pūrva Mīmāṃsā* (ritualistic); and *Uttara Mīmāṃsā* (relating to higher self) also came up. These were generally in aphoristic style (*sūtras*) for facilitating oral transmission. In the new mood and endeavor of systematization, the five elements loomed large and found their way specially into the *Sāṅkhya* and the *Vaiśeṣika*. The floating medicinal ideas and healing practices too could not but be consolidated, and systematized, separating the grain from the chaff. The philosophical positions of the *Sāṅkhya* and the *Vaiśeṣika* of which, as stated earlier, the five elements were an integral part, provided the basic framework for medicinal concepts. In the process, the Atharvavedic magico-religious healing attempts that had held the fort for a long time receded to the background to some

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extent. The new systematised approach to medicine, which took on the appellation of Ayurveda, did not forget it roots, however superstitious they were, in the *Atharvaveda*. Ayurveda was, therefore, recognised as an emanation of the *Atharvaveda*, a continuity of the past, but with an altogether modified approach. In recognition of its Atharvavedic roots, Ayurveda included in its compendium a branch called *Bhūta vidyā* (psychiatry and demonology). In its changed perceptions of medical thought and, more importantly, in its therapeutic practices, Ayurveda appealed not merely to the elite but also to the laity. It would appear that the wave of Buddhism, with its compassion for the common people and the sick, aided this process. Several Buddhist monks were the torch-bearers of Ayurveda and contributed to its practical aspects.

The Ayurvedic compendium comprises eight branches: *Kāyacikitsā* (internal medicine); *Śalya tantra* (surgery); *Śālākya tantra* (ophthalmology and ENT); *Kaumāra bhṛtya* (paediatrics, obstetrics and gynaecology); *Agada tantra* (toxicology); *Rasāyana* (geriatrics and nutrition); *Vājīkaraṇa* (sexology); *Bhūta vidyā* (psychiatry and demonology). These are the themes described in Ayurvedic classics and other texts, but each has presented them under its own different heads and chapters.

The systematized preservation of Ayurvedic knowledge had its social compulsions. Amidst the expanding human settlements in different parts specially of the Indo-Gangetic plains, there also came about urbanization here and there. In the emerging social milieu, quacks and charlatans had also assumed the role of healers. This had to be arrested in the interest of the welfare of the people by methodical Ayurvedic practices and training. A new class called the *vaidyas* emerged and they were involved in standardized health-care.

Significantly, the process of standardization itself was a result of discussions among several sages who used to organize symposia from time to time. In the Ayurvedic classics, there is a reference to the origin of Ayurveda, to Brahma, the Creator. He is supposed to have taught it to Dakṣa Prajāpati who in turn imparted that knowledge to Aśvins from whom Indra obtained the medical knowledge. It was Bhāradvāja, the eminent sage deputed by an assembly of other sages, who learnt it from celestial Indra, brought it to the terrestrial level and imparted it to another sage, Ātreya. Such an origin of Ayurveda, as presented in a few introductory verses of the *Carāka saṃhitā* is neither history nor the strength of Ayurveda, but a mythology to gain social acceptability and to be in tune with the general mood of the people who believed in a creator. Devoid of a brief reference to its divine origin, the Ayurvedic texts are indeed fascinating medical treatises.

The two Ayurvedic classics are the *Caraka saṃhitā* and the *Suśruta samhitā*. The third one, the *Aṣṭāṅgahṛdaya* of Vāgbhaṭa of about the 7th century A.D. is also recognized as an Ayurvedic authority, though by and large it has relied on the first two with some elaboration here and there. The *Caraka saṃhitā* is unfolded in the form of a dialgoue between Punarvasu Ātreya and one of his six disciples, Agniveśa, the other five being Bhela, Jatukarṇa, Parāśara, Hārīta and Kṣarapāṇi. It has been stated that Agniveśa was the best of Ātreya's pupils and that he documented faithfully his preceptor's methodical exposition and prepared a compendium under the title *Agniveśa tantra*. A few centuries later Caraka enlarged and refined it; hence the name *Caraka saṃhitā*. The date of this treatise is uncertain, varying from the 2nd century B.C., to the 2nd century A.D. Around

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the 4th century A.D., however, one Dṛḍhbala, a Kashmiri savant, redacted the then existing *Caraka saṃhitā* by adding 17 more chapters to the *Cikitsāsthāna* as well as incorporating the entire sections called the *Kalpa* and *Siddhi*.

The *Caraka saṃhitā* that has come down to us consists of 120 chapters under eight *sthānas* or sections: *Sūtrasthāna* (30); *Nidānasthāna* (8); *Vimānasthāna (8); Śarīrasthāna (8); Indriyasthāna (12); Cikitsāsthāna (30); Kalpasthāna (12);* and *Siddhisthāna (12)* dealing respectively with the fundamentals, diagnosis, specific apsects, human body, fatal signs, treatment or therapeutic procedure, pharmaceuticals and successful management. There is a view that, in addition to these eight sections, another section entitled *Uttaratantra* is also a part of the *Caraka saṃhitā*.

The *Suśruta saṃhitā* which belongs to the tradition of Dhanvantari in the divine lineage, and compiled by Suśruta as the name indicates, is believed to be a later work than the *Caraka samhitā*. The date of this text is also uncertain, but it is probably of the 3rd or 4th century A.D. In any case the extant *saṃhitā* is the redacted version of Nāgārjuna, and contains 184 chapters under six *sthānas* dealing with fundamental, postulates, pathology, embryology and anatomy, therapeutic and surgical treatment, and toxicology. There is a final section called the *Uttara tantra* on specialized knowledge relating to the topics of the previous sections. While the *Caraka saṃhitā* lays emphasis on therapeutic medicine, *Suśruta saṃhitā* gives surgical practices a place of distinction. As for the materia medica more than 600 drugs mostly herbal and those of animal and mineral origin have been mentioned in the *Caraka saṃhitā* while the *Suśruta* has a little more, about 650.

Intellectual Coherence

The thought-structure of Ayurveda, apart from its intricately worked out therapeutics, is an example of intellectual coherence — a consistent way of looking at the phenomenal and the biological world of man, plants and animals. It has rightly recognized the inter-relatedness of body and mind, of food and medicine, and within the body, of the various physiological processes. Central to all of these is the holistic approach with its concept of balance or equilibrium which has pride of place. The equilibrium or the harmony of both mind and the physical body is a prerequisite for a healthy and purposeful life, and for the realisation of human goals- *dharma, artha* and *kāma*. Recognizing the dynamic interaction between man (microcosm) and the universe (macrocosm), the Ayurvedic theory of *loka-puruṣa-sāmya* envisages that an individual's health would be sound and vibrant, if the interaction is natural and wholesome, while a disharmonious interaction would lead to a diseased state.

Although it is rather difficult to be definitive as to whether or not the evolutionary exposition of the *Sāṅkhya* was earlier than that found in the Ayurveda, the latter's approach to the total constitution (*prakṛti)* of an individual (*puruṣa)* has its own originality. Like the *Sāṅkhya*, Ayurveda thinks of an individual's *prakṛti* in terms of its three *guṇas* (attributes), namely, *sattva* (essence), *rajas* (energetic) and *tamas* (inertial) in a balanced state. Their imbalance results in a vitiated mind-body system as a whole,

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while the nature and the extent of such vitiation vary from individual to individual. Any therapy, therefore, has to be determined keeping in view the constitution of an individual and his suitability (*sātmya)* for a curative procedure. It is important to note that Ayurveda emphasizes that the individual ***as a whole*** is to be examined in detail in respect of his disease and not merely his disease. Even in a patient, his residual or positive health is to be engendered simultaneously with the cure of the disease. Preventive and health-promotive measures are important even for a healthy individual. His daily (*dinacaryā)* and seasonal (*ṛtucaryā)* routine on the one hand and, on the other, nutritious food and drink as well as rejuvenating compositions, among others, constitute the health-promotive measures— all towards a balanced body and mind (*deha-mānasa*) and equally balanced physiologocial processes within.

Pañcamahābhūtas

Ayurveda's intellectual coherence in the explanation of various physiological processes merits special attention. Life, according to Ayurveda, is of four dimensions — the physical body (*śarīra)*, senses (*indryia),* psyche (*sattva)* and the conscious entity or soul (*ātmā)*. The physical body is a congregation and an interplay of *pañcamahābhūtas* right from the stage of conception. The embryo or foetus formed by the reproductive energetic principles is divided or separated into a miniature human form in all its aspects by *vāyu*, while *tejas* provides complexion and other features through metabolic activities. The *ap* element maintains the moisture, and *pṛthvī* brings about the desired solidification leading to shape and size; *ākāśa* gives the ambaence for expansion and blows up *srotas* created by *vāyu* and *tejas*. The growth or the manifold development of the embryo, however, is dependent principally on *vāyu* and the nutrient fluid.

The five elements are also involved in the formation of six *rasas,* viz., sweet (*madhura: prthvī + ap);* sour (*āmla: tejas* and *prthvī)*; salt (*lavaṇa: ap + tejas);* bitter (*tikta: ākāśa + vāyu)*; pungent (*kaṭu: tejas + vāyu)*; and astringent (*kaṣāya: pṛthvī + vāyu)*. However, it should not be understood that a *rasa* is formed by or constituted of the concerned two elements only; for, while the two elements are predominant in a *rasa*, the other three would also enter into its composition—a coherent holistic approach.

The *tejas* element has a vital role to play in the digestive and metabolic processes in the form of *pitta* or *agni*. The word, *pācakāgni* (digestive fire) is regarded as the effective agency for digestion, based in the stomach and small intestines, rendering the ingested food into assimilable forms to be channelized for nourishing the tissues. The nutrient fluid, a product of digestion, is called *rasa* (essence or chyme) which circulates and nourishes the other six *dhātus—rakta* (blood), *māṃsa* (flesh), *medas*(faty), *majjā* (marrow), *asthi* (bone) and *śukra* (the reproductive essence). Each *dhātu* , in furtherance of its role in the formation of the next *dhātu*, is also associated with what is called *dhātvagni*. These and the *agni* of each element (*bhūtāgni)* would be involved in the physiological processes in a coordinated manner.

A seminal concept of Ayurveda is its *tridhātu-tridoṣa* or *vāta, pitta* and *kapha*-a three 'humoral' theory that encompasses not only the physical and physiological processes in

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the human body but also the pathogenesis of diseases and their symptoms. Though they could be translated into English as wind, bile and phlegm respectively, or the three 'humours', each one of them and in fact the three as a whole, have much wider meaning and applicability in the Ayurvedic conceptual framework of health and disease. Health is the equilibrium, harmony or balance among the *tridoṣas* in the body, and their disequilibrium, disharmony or imbalance would be the diseased state. It should be noted that the *tridoṣas* or the *tridhātus* which have the potentiality of being vitiated (*dūṣya)* are a part of the five elements. Caraka states that the *tridoṣas* are eternally present in the body of living beings either normal or abnormal, besides regulating the utilisation of the nutrient and energetic fluids at the cellular level. Their significance lies in the fact that all anabolic and katabolic activities that comprise the metabolism of digestion are governed by *vāta* which also controls the movements of both *pitta* and *kapha*. Besides, *vāta* is involved in voluntary actions and the discharge of waste products through its five forms—*prāṇa, udāna, samāna, vyāna* and *apāna*.

Pitta, composed of *tejas* element, is in the nature of an essence (*sāttvic)*. Vision, inner heat production, digestion, lustre of the body, intelligence, cheerfulness and such other mental states owe their manifestation to *pitta* through its five aspects: *ālocaka, rañjaka, sādhaka, bhrājaka* and *pācaka*. *Kapha*, though regarded as inertial (*tāmasik)* has its own role not only in the maintenance of needed strength and environment within the body right from the cellular levels but also in the display of such mental faculties as courage, forbearance, zeal, and knowledge, besides in the smooth functioning of various activities-through its five forms—*kledaka, avalambaka, tarpaka, bodhaka* and *śleṣmaka*.

The question as to whether the *tridoṣas* and associated Ayurvedic concepts can be understood in terms of western or modern medicine needs some consideration. The exponents of Ayurveda by and large hold the view that their capsuled type of translation in the matrix of modern medicine would be inaccurate and would not carry the full import of the Sanskrit words. Meulenbeld, however, writes: 'Notwithstanding the objections of the vindicators of Ayurveda it seems quite appropriate to render the names of the doṣas by equivalents that graphically described what is meant in spite of all the assertions to the contrary. The doṣas are primarily of a material nature and have developed only secondarily into explanatory and classificatory concepts. Their materiality emerges, for example, from their being transported in vessels throughout the body. More concretely even, vāta or wind manifests itself as gas in the bowels, pitta or bile as the bile in the gall-bladder, and kapha or phlegm as expectorated sputum. The signs indicating over-activity, due to organismal imbalance, of one of the humours are, to be sure, sometimes of a gross and easily understood character, but may also be rather subtle and only remotely connected with their underlying cause. The ever-moving wind, for example, gives rise to sudden pains and shifts in body temperature, bile causes sensations of heat and fever, and phlegm is at the origin of swelling and torpor. These actions of the humours are easily understandable, but each of three is also like a spider in the centre of a web of connections and correspondences that not only comprises the whole individual organism, both somatically and mentally, even spiritually, but encompasses the whole universe. Each of the humours has affinities with particular parts of the body, tissues, tastes, colours, and

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so on, and equally with mental faculties, moods, behavioural patterns etc. The system of correspondences extends to the type of country one resides in, the season one lives in, and so on. This is one of the features that make Ayurveda into a holistic medical system'. (Seattle Lectures, March 1991 p.3)

The intellectual coherence of the doctrine of five elements also led to the explanation of the continuum of the succeeding six bodily developmental *dhātus:* blood, flesh, fats bone, marrow and the reproductive essence, as well as the healthy or diseased condition in terms of *tridoṣas.* Both the physiological and psychological dimensions could find their elucidation in this thought- process in terms of either harmony or disharmony of body-mind interrelatedness as well as the five elements. In tune with the number (5) of elements, *vāta, pitta,* and *kapha* have also been conceived in the framework of their five functions in a comprehensive manner.

Another set of five entities in Ayurveda relates to (i) *rasa* (the tastes); (ii) *guṇa* (attributes); (iii) *vīrya* (potency of a drug); (iv) *vipāka* (action or change in respect of drug in the very process of digestion and metabolism); and (v) *prabhāva* (ultimate and decisive influence of a drug). Caraka has clearly stated: '*Rasa* is known by its contact with senses (particularly tongue); *vipāka* by observing the effect (of a drug) on the body; *vīrya*, by the action exuded during the period from the administration of a drug to its exertion. In cases where, in spite of similarity in *rasa, guna, vīrya* and *vipāka*, there is difference (in the action of a drug), this is said to be due to its *prabhāva*.

Debates

The intellectual nuances of Ayurveda can be gauged by the debates that were taking place among the physician-sages from time to time. In fact Ayurveda was the result of a consensus among them. The following discussion on *rasa,* as recorded in the *Caraka saṃhitā,* is illustrative of such discussions in which even kings participated.

'There is only one *rasa*, said Bhadrakāpya, which is one of the five sense objects, being the object of gustatory organ, and not different from water. Two *rasas*, said the brāhmaṇa, a descendant of Śakunta, and of Mudgala, such as eliminating, pacifying and moderate. Four *rasas* said Hiraṇyākṣa, the descendant of Kauśika, such as palatable and wholesome, palatable but unwholesome, unpalatable but wholesome, and unpalatable and unwholesome. Five *rasas*, said Kumaraśiva, son of Bhāradvāja, such as those derived from *bhūmi* (earth), *udaka* (water), *agni* (fire), *vāyu* (air) and *antarikṣa* (*ākāśa*). Six *rasas,* stated Varyavida, the sage king, such as heavy, light, cold, hot, unctuous and rough. Seven *rasas* said Nimi, the king of Videha, such as sweet, sour, saline, pungent, bitter, astringent and alkaline; eight *rasas* said Baliga.. And innumerable *rasas*, Kankāyana, the physician of Bāhlīka pointed out, because factors like substratum, attributes, actions and tastes are innumerable'. (*Caraka saṃhitā, Sūtra, XXVI*, 3-10 (tr. P.V.Sharma)

Punavarsu Ātreya, the preceptor of Agniveśa, met the differing viewpoints and explained how only six *rasas*—sweet, sour, saline, pungent, bitter and astringent (water being their source) should be recognized on the basis of the five elements.

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Yet another discussion on therapeutics itself is significant. Punarvasu Ātreya asserts that 'the therapy administered rationally is capable of (providing) disease free condition (health)'.

'Not thus', observed Maitreya, 'the reason is: it is observed that some patients having all the necessary materials, having been looked after by the attendants, having patience and having been attended on by expert physicians recover, while some others in similar conditions die. Thus therapeutic measures have no role.... While being treated, as a patient recovers and (even when treated similarly) another patient dies, it may be taken that therapeutics is no different from non-therapeutics'.

'Maitreya! You think wrongly', says Ātreya. The argument is this: That patients inspite of having been treated with therapy (equipped with sixteen qualities die, is incorrect because therapy is never impotent in respect of curable diseases. The patients who recover without the entire therapy (in these cases too) it its not correct to say that the administration of total therapy does not contribute to their recovery. For example, when somebody helps a fallen person, if he is able to get up on his own, he stands up more quickly and easily. Likewise patients recover with total therapy. In the case of patients who die even after total therapy , they are all not liable to recovery because all diseases are not totally curable by therapeutic measures... As an archer having theoretical knowledge and practical experience does not fail when he takes the bow and strikes the arrow to a not distant and big object and thus achieves the desired result, likewise, the physician, endowed with expertise and equipped with all necessary materials, proceeds with the treatment of a patient after careful examination and alleviates the curable disease without fail and provides normalcy to the patient. Therefore, it is not correct to say that therapeutics is not different from non-therapeutics' (*Caraka saṃhitā, Sūtra, X, 3-5)*.

The foregoing examples of intellectual discourses, both fundamental and applied, shed ample light on the methodology by which Auyrveda was text-stabilized and its procedure standardized. Even the manner of discussion was also regarded as very important as the theme to be discussed. Caraka says that 'a physician should discuss with a physician' and that 'discussions with specialists would promote the pursuit or the advancement of knowledge, illumine intellect and bring forth new ideas'. He has also provided details of what he calls 'the friendly and hostile' discussions and recommends that one should speak with reason in even hostile discussions. He has explained about forty terms relating to debate, proposition and its establishment, reasoning with examples and the means of acquiring valid knowledge, rectification of doubt, rejoinder and the like. These are the terms which one encounters in the *Nyāya* system. Caraka rightly emphasizes that 'one should speak about everything with reasoning' and that 'conflicts of debate, if endowed with reasoning, should be devoid of malice and promote the cause of medicine due to its quality of enhancing the excellence of intellect, and undamaged intellect leads to success in all actions' (*Caraka saṃhitā, vimāna, VIII)*. In addition, Caraka has stressed that a physician should be well informed of the areas of medicaments and the nature of their action as well as the result of an action, its procedure, space, and time, before he embarks upon his therapeutic treatment as a physician.

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Ayurvedic Therapy

Ayurveda has rightly emphasized that the qualities of a physician are as important as his intellect. Caraka says: '... a person desiring long life and health should not take any medicine administered by an irrational physician (or a quack); a man falls into hell even if he talks with a physician devoid of virtue, sinner and wicked... Receiving food, drink or money from the surrendered patient is also improper.. the wise one aspiring to become a physician should spare no efforts in acquiring good qualities so that he may become a life-giver to human beings. Learning, rationality, specific knowledge, memory, devotion and action—nothing is unachievable for one who possesses these six qualities. Frendliness and compassion towards a patient, attachment to the remediable, and indifference to those who are moving towards their end, this should be the four-fold attitude of a physician. (*Sūtra*, I.126-133; IX.23-26)

The three main categories of Ayurvedic therapy (*cikitsā*) are: (i) divine therapy (*daiva vyapāśraya*); (ii) rational therapy (*yukti vyapāśraya cikitsā*); and (iii) psychotherapy (*sattvāvajaya*). The first one is particularly undertaken in respect of diseases for which no cause(s) can be known with exactitude, but are attributed to the result of a patient's actions (*karma*) in his previous birth or births. Ayurveda thus subscribes to the *karma* theory. As in the Atharvavedic practices, such diseases, not necessarily mental or psychical ones, are sought to be cured through prayers, incantations, amulets, propitiation specially of a certain god or goddess and the like. This type of 'therapy' continues even to this day practically in every part of the country. The second type of therapy is in the nature of a rational attempt at curing disease after thorough examination of a patient as a whole, his *prakṛti* as well as his disease by the methods prescribed in Ayurveda. In this respect, a physician brings to bear upon his experience his knowledge of the postulates relating to *tridoṣa, rasa, vīrya* and *vipāka, āma, sātmya, sāmānya* and *viśeṣa* (homologous versus heterologus) and the like, keeping in view the interplay of the five elements and the restoration of the balance of *tridoṣas*. The purificatory as well as the curative methods are the twin aspects of Ayurvedic therapy. The former is, by and large, concerned with what is known as *pañcakarma* (five processes) for both external and internal purification in a systematic manner.

Pañcakarma: Caraka refers to the five processes or measures in the second chapter of the *Sūtrasthāna* of his *samhitā* which deals with the seeds of *apāmārga (Achyranthes aspera* Linn) and a host of other herbs or their products. According to him, the seeds of *apāmārga*, fruits of *pippalī*, (pepper) and eighteen others are to be used for the purification or evacuation of vitiated factors (*doṣas*) in the head, chronic rhinitis, helminthiasis, epilepsy, insomnia and fainting. Eleven drugs, either singly or in the desired combination, could be employed for emesis in the case of diseases arising out of *kapha* and *pitta* which would cause disorders in the intestines. Fifteen drugs might be used for purgation if the vitiated factor is located in the colon. Twenty other types of drugs, fats and salts could be employed for a non-unctuous enema specially in the cases of constipation; and with the same group of drugs, an unctuous enema for the alleviation of *vāta* could also be effective. In the current practices adopted in Ayurvedic hospitals, *pañcakarma* is an

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important first step for treating a patient and is somewhat similar to that which Caraka described nearly 1800 years ago. But the general nomenclature of the five measures of treatment are called *vamana* (emetics); *virecana* (purgatives); *āsthapāna vasti* (an enema with medicated decoction, but without oil or ghee or any fatty substances); *ānuvāsana vasti* (enema with medicated oil or ghee or other fatty substances); and *śirovecana* (errhines).

Diagnosis: The triumph of modern medicine in the cure of most diseases is the triumph of its diagnostic methods and tools. In all of these it is the direct perception and inference that provide a modern physician or surgeon with an insight into his therapeutic or surgical determinants.Ayurveda recognizes the fundamental importance of examining a patient by direct perception (*pratyakṣa*) and inference (*anumāna*). In addition, however, it accepts verbal or textual knowledge as testimony (*āptopadeśa)* — the orally transmitted tradition or a record of observational experience of Ayurvedic experts in diagnosis in the same way as a student of modern medicine accepts the textual as well as his preceptor's exposition. *Pratyakṣa, anumāna* and *āptopadeśa* are called collectively the *trividha pramāṇa or trividha parīkṣā* (three methods of diagnostic knowledge or examination).

According to Caraka, the fourth but an important supplementary diagnostie method, is *yukti* by which a physician should try to obtain information of a disease through experimentation or planned investigations either to confirm or negate his perceptions of the causative factors of disease based on the first three methods. The physical examination of a patient is carried out by a physician using his five senses (*pañcendriya parīkṣā* or *pañcavidha parīkṣā*) in the same way as a physician of modern medicine does, with the aid of instruments which are an extension of his sense perceptions. The sixth method, in Ayurvedic diagnosis similar to modern medical examination, is the questioning (*praśna*) of a patient in great detail, the interrogation being done in an endearing manner treating the patient as a friend. This method is adopted for gaining an insight into the history of the disease of a patient as well as the environmental aspects. As for the examination or diagnosis of a disease in a patient, eight chosen points (*aṣṭavidha parīkṣā*) constitute the general examination : pulse, urine, stool, tongue, voice and speech, skin, eyes and the face, followed by the examination of a patient's head and neck, chest, abdomen, and limbs. More importantly, a patient has to be examined to evaluate ten aspects of (*daśavidha parīkṣa*), namely: (i) his constitution (*prākṛti*) including his mental and psycho-physical aspects; (ii) disease susceptibility (*vikṛti)*; (iii) quality of tissues (*sāra*); (iv) compactness of body (*saṃhanana*); (v) body measures or anthropometry (*pramāṇa*); (vi) suitability or adaptability (*sātmya*); (vii) mental strength (*sattva*); (viii) digestive power (*āhāra śakti*); (ix) exercise-enduring capacity (*vyāyāma śakti*); and (x) age and the rate of ageing (*vaikaraṇa*).

The classical Ayurvedic texts do not speak of pulse examination (*nāḍī parīkṣā*) at all. Possibly, this practice began to be followed from about the 11th century or so as a result of the interaction with Siddha (South India : Tamil Nadu) and the Unani systems in which pulse examination is an important method. Pulse-reading is intended to find out the nature and the extent of the three *doṣas* (*vāta, pitta* and *kapha*) either singly or in combination. This requires sensitive training not only to palpate a patient's pulse by the

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proper positioning of the physician's three (index, middle and ring) fingers on the pulse, but also to detect and determine mentally the type of vitiation from the rate and rhythm, the amplitude, and the volume of the pulse. The general understanding is that the **first** relates to *vāta*, the second to *pitta*, and the third to *kapha*, as communicated to the physician by his index, middle and the ring fingers respectively. If the movement of the pulse is like that of a snake or hopping frog or walking of a swan, as felt by a physician through his index, middle or ring finger respectively, it is recognized that the disease is due to *vāta, pitta* and *kapha* accordingly. A mixed perception may denote complicated vitiation. There are also claims that a physician who is well trained in pulse examination can perceive the *doṣas* by using only one finger and that the pulse examination is the best diagnostic tool. In practice, this is one of the methods of Ayurvedic diagnosis of a disease, urine and stool examination being also part of eight-point diagnosis.

What Caraka called the quadruple (*sūtra, ix*) and recorded by him about 1800 years ago is full of meaning even now—the quadruple of physician, drug, attendant and patient. His prescription of the quadruple qualities of each is noteworthy : 'excellence in theoretical knowledge, extensive practical experience, dexterity and cleanliness (physician); abundance, efficacy, various pharmaceutical forms, and normal composition (drugs); knowledge of attendance, dexterity, loyalty, and clean habits (attendant); memory, obedience, fearlessness, and providing all information about his ailment (patient). Caraka adds that, 'this quadruple consisting of sixteen qualities is the cause of success in curing a disease; but the physician is the main person because of his special qualities and expertise.'

Surgery

Eighty years ago Guthrie, the noted historian of medicine, remarked : 'It was in surgery above all that the ancient Hindus excelled. Suśruta described more than a hundred instruments. This was their greatest contribution to the art of healing and the work was bold and distinctive. It is not unlikely, though difficult to prove, that some of it was of Greek origin. Some, indeed, state that the Greeks drew much of their knowledge from the Hindus (p.19)'. Another historian of medicine, M.Neuberger, pointed out that 'the outstanding feats of ancient Indian surgery related to laparotomy, lithotomy and plastic operations. (p.58)'. It would appear that Suśruta may be regarded as the 'Father of Indian Surgery' since he has provided in his *saṃhitā* a detailed account of several surgical operations, surgical instruments (20 sharp; 101 blunt and auxiliaries) with pre- and post-operative measures. What characterizes his treatise is his methodical presentation of the practical dimensions of surgery under eight heads: incision (*bhedana*); excision (*chedana*); scarification or curettage (*lekhana*); puncturing or tapping (*vedhana*); probing or exploring (*eṣaṇa*); extraction (*āharaṇa*); drainage or evacuation (*visrāvaṇa*); and suturing (*śīvana*). The sharp instruments, some of them resembling the mouths or beaks of animals or birds, include scalpels, lances, probes, speculums, forceps, tongs, trocar, needles and syringes. Details have been given of how they should be made from metals, their dimensions, handles and the like. One can also see in the *Suśruta saṃhitā* a vivid account of some

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surgical operations like cataract-couching, anal fistula treatment and rhinoplasty. It would seem that plastic surgery was not in practice in the west till the middle of the 18th century.

Surgical operations needed, then as now, an expertise acquired by intensive practical training as well as exact anatomical knowledge. As for the necessary training, an Ayurvedic student practised incision on fruits or gourds, excision on a full water bag or the bladder of a dead animal, scarification on stretched skins of deer, goat or sheep on which hair was allowed to remain, puncturing on distended bags, venesection either on bloodvessels of dead cattle or on the hollow stalks of lotus plants, probing on the reed of a bamboo or on the mouth of a particular dried gourd, cauterization on soft meat or flesh of an animal and so on. The suturing material was generally made of flax, hemp or bark fibres. A simple but effective method of joining the lips of severe wounds was to cause them to be bitten by ants and then cutting off the bodies of ants, leaving behind the mandibles which would clamp together the lips of the wound. This practice was adopted later by some Arabic surgeons.

The question of actual dissection of a dead human body needs some explanation. Would it have been possible for an Ayurvedic student to dissect a dead body and thus to observe the human anatomical structure? or was actual dissection a taboo in view of the social injunctions relating to the impurity associated with touching a dead body? The *Suśruta saṃhitā* has recorded as follows:

'..... any one desirous of acquiring a thorough knowledge of anatomy should prepare a dead body and carefully observe, by dissecting it, and examining its different parts. For, a thorough knowledge can be acquired only by comparing the accounts given in the authoritative texts (*śāstras*) with direct observation.'

'A dead body chosen for this observation should not lack any of its parts (organs) ; it should not be of a person who has lived up to a hundred years (i.e. ripe old age), nor of one who had died of a protracted disease or of poison. The excrements should be removed from the entrails and the body should be placed in slow flowing water, taking care to see that it might not be eaten by fish or drift away, after having covered it entirely with the outer sheaths of *muñja* grass, *kuśa* grass, hemp or rope, etc. After seven days the body would be thoroughly decomposed, when the observer should slowly scrape off the decomposed skin and other layers, with a brush made of grass-roots, hair or *kuśa* grass with a blade or with a strip of bamboo and carefully observe with his own eyes all the different organs, internal and external, beginning with the skin.....' (Śu.Śa.III.5.61).

It is true that there were social injunctions against touching a dead body, or its use other than its disposal either by cremation or burial. The polluting aspect of a corpse or the segregation of those who touched it until they underwent purificatory bath or rites was a part of social compulsions. Nonetheless, there is no denying that the art of surgery would not have attained an appreciable expertise which was essential in cases that needed surgery, were it not for the careful observation of internal anatomy of the human body by medical students of that time. The importance of a personal direct observation of dead body for a surgeon or a physician to gain anatomical knowledge was strongly advocated by Suśruta.

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The Spread of Ayurveda

In the first half of the first millenium A.D., the innate strength of Ayurveda in its foundational philosophical ideas and in its twin aspects of preserving and promoting health in healthy persons, and the cure of disease with proven methods of diagnosis and therapeutics, had its appeal to the people of other countries too. Men of medicine then had no inhibitions whatsoever in adopting curative practices of the other culture areas. For, the cure of the sick was a noble endeavour and a coveted human value. There is evidence to indicate that Iran, even before it was conquered by the Arabs, was influenced by the Ayurvedic system. It would appear that one Burziya, a physician of the Iranian King, Chosroes I (531-579 A.D) had visited India and carried back with him Ayurvedic ideas especially on embryology as noted by him in his autobiography. Before his time, Ayurvedic practices might have been known in the medical school (5th century A.D.) that was established at Gundesapur in Susiana (Persia) by Nestorians after their expulsion from Byzantine. As noted before, in the symposium on *rasa,* Kankāyana, a physician from Bāhlika had participated, and Bāhlika is another name for Bactria which lay on the other side of the Hindu Kush mountains as part of the expanded dominions of Chosroes I.

Central Asia, which also comprised Persia, was prone to be influenced by Ayurveda as it was from early times the meeting place for traders and missionaries, craftsmen and travellers. The famous spice and silk route attracted them from the far east, south and west Asia, in which Indian traders and Buddhists also played their role. Of relevance to us is what has come to be known as the Bower Manuscript discovered by the British army officer A.Bower in 1890 at the Kuchan monastery (in Chinese Turkestan). In 1912, its text was deciphered by A.F.R. Hoernle who, on palaeographic grounds, fixed its date as about 450 A.D. But its contents were undoubtedly earlier. A notable aspect of this manuscript is that it represents another tradition, parallel to Caraka and Bhela, but through the Ātreya school. Some of the medicinal formulae found in the Bower Manuscript are more or less similar to or almost identical with those in the *Caraka saṃhitā.* This manuscript has seven texts written in Sanskrit by four persons, of which three are exclusively concerned with medicine: the first deals with garlic and gives several recipes specially for curing eye diseases. The second, an extensive text, called *Navanītakam* (quintessence), has 16 chapters. The third contains 72 verses providing details of 14 medical formulae. But in linguistic style, this manuscript seems to be older than the works of Caraka and Suśruta.

It seems certain that Central Asia was the original place of garlic, its cultivation and uses as a condiment and medicine. It is very likely that garlic might have come to India through trade with Central Asia around the first century B.C. or A.D, and entered the Indian medical tradition. The *Kaśyapa saṃhitā,* like the Bower Manuscript, has a section called *laśuna kalpa* on garlic, while the *Caraka* and *Suśruta samhitās,* the classical Ayurvedic texts, do not appear to have accorded such a status to garlic. It is, however, interesting to note that in the *Aṣṭāṅgahṛdaya* of Vāgbhaṭa (also *Aṣṭāṅgasaṃgraha* of older Vāgbhaṭa), garlic is regarded as one of the rejuvenating (*rasāyana*) drugs. Significantly the Bower Manuscript has a laudatory reference to garlic in its first medical part. *Śilājatu* (bitumen) is another drug discussed in the twelfth chapter of the *Navanītaka* and it has

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been described as a *rasāyana*. Further, the four chapters of this text devoted to *rasāyana* are somewhat similar to the first chapter in the therapeutics section of *Caraka saṃhitā*. The Bower Manuscript, if studied in depth in a historical framework, might throw some light on the pre-classical and the classical traditions of Ayurveda and their mutual inter-relatedness. Ayurvedic materia medica has the names of some exotic plant products: asafoetida (*hingu*); garlic, and onion, which are not mentioned in the Vedic texts. It is conceivable, therefore, that these and some other plants and their products might have found their way into the pre-classical Ayurvedic tradition.

Tibet, which was influenced to a great extent by Buddhism was another region where Ayurvedic practices found a congenial home through several Buddhist monks who were well versed in such practices and committed as they indeed were to the care of the sick. The Tibetan system of medicine owes a great deal to Ayurveda—its *tridoṣa* concept and the use of certain herbs as drugs. Mongolia was another area where Ayurveda was well known through the translations of Tibetan medical works. Farther east, China, Korea and Japan too adopted some Ayurvedic drugs in their medicare. With the establishment of the kingdoms and colonies in which Indian elements were involved in Indo-China and Indonesia, Ayurvedic knowledge spread also to these parts in the closing century of the first millennium A.D. It is significant to observe that in an inscription (c. 850 A.D.) of Cambodia (Kambuja), there is a reference to the *Suśruta saṃhitā*. Jayavarman VIII, the Grand Monarch of Kambuja (13th century.), established as many as 102 *ārogyaśālās* (health centres or hospitals) and an inscription of his regime gives details of diet and medicinal plants supplied to the health centres. The Balinese tradition of Indonesia accorded a status to Ayurveda through its art forms. For example, there is a pictorial representation of Brahmā imparting the secrets of psychosomatic medicine (*pangiwa*) to Durgā and Kāḷikā, Brahmā holding a palm-leaf manuscript in his hand. Another illustration depicts bamboo syringes to be used for the lumbar or alimentary canal region along with hollow lotus stem to insufflate air or water into the intestines, and a bamboo squirt for injecting medicaments into the urethra. Ayurveda spread to Burma and Ceylon too and their medical treatises mutatis mutandis are based on Ayurveda (Majumdar, pp.260-2).

The western spread of Ayurveda was important and interesting alike: important because of its influence on the Islamic countries, and through them on the Latin medieval Europe; interesting because medicine knows no barriers of religion or region and the Islamic savants played a key role in the tranmission and assimilation of what could well have been branded by them as Hindu medicine from a superstitious land of idol worship. Around the 8th century A.D. Baghdad had emerged as the accredited centre of scholastic activity replacing Gundespaur in Iran. Earlier in the seventh century, Arab traders frequently visited the Malabar coast and had a sound knowledge of Indian spices, and other plant products as well as drugs. In the eighth century they had established themselves in the province of Sind. During this phase there was also an exchange of scholars between the Abbasid Caliphate in Baghdad and India. Harun al-Rashid, an enlightened Abbasid Caliph, actively encouraged the study of the Indian system of medicine and he as well as his successors patronized the translation of Ayurvedic classics from Sanskrit to Arabic. There was an Indian family of scholars called the Barmaki family

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and one of them is stated to have become the physician-in-chief of the state dispensary in Baghdad after he successfully cured his royal patient of a long-standing stomach complaint. He also translated the *Sūśruta saṃhitā* into Arabic and it was known as 'Susrud'. The noted Arabic scholar, Ali ibn Zain, rendered the *Caraka saṃhitā* into Arabic and it was known as 'Sarag'. A few decades later, *Nidāna* (aetiology) of Mādhava and the *Aṣṭāṅgahṛdaya* of Vāgbhaṭa were also translated under the titles *Badan* and *Aṣṭankar*. These Ayurvedic texts were available to the Arabic world by the 10th century. Zain's student, Abu Bakr Muhammad ibn Zakariyya al-Razi (known later in medieval Europe as Rhazes) studied both the Greco-Arabic and Indian systems and incorporated into his magnum opus entitled *Kitāb-al-hawi* several aspects of Ayurvedic practices. In the thirteenth century, this comprehensive book was translated into Latin by Moses Farachi and it became the standard medical book of the middle ages. Ayurvedic practices thus reached Europe in Latin language.

In the meantime some medical men from Khorasan had visited India and written treatises on the achievements of Indian physicians: Abu-Mansur Muvaffak Ali Khiravi wrote in Dari (a form of Persian) a book under the title: *Kitāb-ul-abniya ' an-Haqa'iq-il-adviya* (The Book of Main Properties of Drugs) in which he adopted the Ayurvedic method of classifying drugs. He recorded that 'Indians have many drugs which are more effective and their possibility to advance medical science is greater. Many drugs could not be seen in other parts of the world, but in India' (Nuraliev, p.99). Another physician, Abu Bakar Rabi ibn Ahmad Ahavaini al-Bukhari, in his book: *Kitāb-Hidayat al-Mutallimin fiz-tibb* (Guidance to Learning Medicine) dealt with the principles of Ayurveda.

Abu Raihan Bīrūnī (973–1048) came to India as a captive of Ghazni Mahamud and sojourned mostly in the north-western parts of India for well over a decade. Though he was much interested in Indian astronomy of which he was an able transmitter, his encyclopedic mind absorbed the knowledge of Indian medicinal plants and remedies. In his book *Kitāb-al-Ṣaydana-phit-tibb* (a book on pharmacology), which gives detailed descriptions of about 4500 plants, animals and drugs, al- Bīrūnī included nearly 350 Indian names of medicinal plants and drugs.

It was the contemporary of al- Bīrūnī, by name Abu 'Ali Husain ibn Abdullāh ibn Sīnā (980–1036) who occupied the centre-stage in the Islamic medical scenario. Known to the western world as Avicenna and in India as ibn Sīnā, he prepared an authoritative work on Greco-Arabic medicine or *Unani* (an outlandish form of Ionia of the Greek archipelago which produced great pre-Socratic thinkers) under the title Al-Qānūn (The Canon). This was regarded as an authoritative medical treatise in Europe till the seventeenth century and is still a reference medical manual for Unani physicians in India. *Al- Qānūn* was written in Arabic and its full translation into Persian was done in India by Hakim Ali Gilani in the sixteenth century. It emerged as a medical Bible for Unani practitioners. The works of Al-Razi, Abu Sahi 'Alib. 'Abbas, Al-Kindi, Najibuddin Samarqandi and Ibn Nafis are also important for Unani physicians.

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Unani

Greek medicine or the Hippocratic and later the Galenic system (Hippocrates being the propounder and Galen, its admirer) underwent improvement, modification and diligent systematization by the Arabic medical writers. It was carried to Europe during the 12—13th centuries. At the same time, with the coming into being of Muslim rule in India, the Greco-Arab medicine or Unani made its debut into India. In the succeeding centuries, under the patronage of Muslim kings, Unani began to take roots, flourishing specially under the Mughal rule. Other independent kingdoms like those of Adil Shahi and Qutub Shahi as well as those in Oudh, Rohelkhand, Karnataka and Bengal also encouraged Unani medicine. This new entrant, however, was not looked upon as their opponent by the followers of Ayurveda. Instead, they welcomed it. Hakims and Vaidyas worked side by side whenever the occasion demanded, and the Muslim kings patronized both. They met and discussed, then as now, as physicians, not as Hindu or Muslim.

The reason was not far to seek. The basic approach of Ayurveda and Unani to the preservation of health and the cure of disease was more or less the same, though they differ in some fundamental postulates. According to Unani, the human body is constituted of seven components: elements (*arkan)*; temperament (*mizaj)*; four humours (*akhlat*); organs (*aḍa*); vital spirit (*arwah*); faculties (*quwa)*; and functions (*afal)*. The Unani concept of elements is that of Empedocles (5th century. B.C)—Earth, Fire, Water, and Air, with their four primary qualities: hot, cold, dry and moist. While this postulate was made use of by Alexandrian alchemists, Hippocratic medicine viewed it in a different perspective. The viability of the Indian five elements (four of this type and *ākāśa*) in the Ayurvedic matrix, has been discussed earlier (pp. 16-17). Such an application of elements towards the explanation of physiological processes is noted for its absence either in Greek or in Greco-Arabic medicine. In contradistinction to the *tridoṣa* of Ayurveda, Unani adopted four humours: (i) blood or sanguinous humour; (ii) bile or bilious humor; (iii) phlegm or serous humous; and (iv) black bile or atrabilious. As in Ayurveda, preventive medicine or self-health care is an important aspect of the Unani system. Ibn Sīnā has defined medicine (*tibb*) as 'the knowledge of the estates of the human body in health and decline in health; its purpose is to preserve and endeavour to restore it whenever it is lost; likewise, pure air or environment and exercise'.

Unani physicians depend by and large on pulse-reading and the examination of urine and stools as the diagnotic indicators of a disease. But, as in Ayurveda, they take into consideration the whole personality of a patient in diagnosis and prescribe therapeutic procedures in terms of regimental, dietetic and pharmaco-therapy as well as surgery when needed. Medicated baths, cold ones for a normal person, and hot ones for certain ailments, are also important, according to Unani. Its materia medica includes mostly herbal drugs, besides some of animal and mineral origin. The Unani concept of temperament has its own originality and even drugs are supposed to have their temperament, according to which they are classified.

There is no denying that the establishment of hospitals in India owes its origin to the Muslim rulers who, as noted before, also encouraged Ayurveda. Some of the rulers were

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also well versed both in Unani and Ayurveda. At the instance of Muhammad bin Tuglaq (who was himself a physician, examined patients and treated them), Hakim Diya Muhammad compiled a treatise, *Majumai-Diyaiyya*, which includes some Ayurvedic practices. There is a reference in this book to an earlier work (by Shamsuddin Mustafi) which is stated to be a translation into Persian of an Ayurvedic text. Firoze Shah Tughlaq who was known for his knowledge of Unani *tibb*, a good bone-setter and ophthalmologist, founded a large hospital and dictated a book under the title *Tibbe-Firoz Shahi*. During the reign of Sikandar Lodi, Mian Bawa caused the compilation of a treatise on Indian medicine, *Madmush shifai-Sikandari*, which was based on several Ayurvedic works. In this endeavour both the Hakims and Vaidyas were involved. Mian Taha, also an Amir of Sikandar Lodi, had established a name for himself as the one who had the knowledge of both Unani and Ayurveda. He was also stated to be able to recite by heart several hundreds of verses on Indian medicine!

Unani made rapid strides and attained high status during Mughal rule (1526–1707). There were a large number of Unani physicians who were reputed for their medical knowledge and practices. Several of them came from Shiraj, Gilani, Tabrīz (all in Iran) and other places. Most of these physicians have left behind their medical treatises which have added a veneer of excellence to the Indian medical literature. The Mughal monarchs paid them highly attractive salaries and honoured several of them in recognition of their services. During the Mughal rule many hospitals were established in which the Hakims and Vaidyas were complementary to one another for healing the sick, irrespective of their status or religious labels. It is interesting to note that *Tibbi-Aurangzebi* (dedicated to Aurangazeb) is based mostly on Ayurvedic sources. The Mughal rule was also noted for the establishment of *Tibb madrasas* or Unani-teaching institutions.

Rasaśāstra and the Siddha System

Ayurveda had endogenous evolution while Unani, though of foreign origin, developed in India in its own way. Neither of them, however, had any alchemical origin. Their foundational structure was fortified with the postulate of five or four 'elements', three or four 'humours' and the concept of temperament or the constitution of the human body. Both accepted the inevitability of the decay of the human body and eventually its death.

Around the fourth century A.D., the seeds of a new thinking coupled with esoteric practices, but inspired by Chinese alchemy, began to sprout. In the succeeding five or six centuries, this manifested itself in the form of *Rasaśāstra* (Sanskrit tradition) and the Siddha system (Tamil tradition). It should, however, be emphasized that they were and are, the two sides of the same coin, owing allegiance to the alchemical supremo, mercury, and its compounds, as elixirs of life to attain immortality or 'deathlessness' of the human body in contradistinction to Ayurveda and Unani which at best attempted to rejuvenate and prolong human life. This new approach towards human body found a favourable envirnoment in tāntrism (*Rasaśāstra*), and both yoga and tāntrism (*Siddha*). The latter was greatly influenced by yogic practices, specially *prāṇāyāma* or regulated breathing and believed in the 'tāntrik body' which was presumed to possess certain *Cakras*. It was

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further believed that *Śakti*, the energetic goddess, would reside in what was called the *Kuṇḍalinī* in the region of the anal orifice and genitals. Through yogic practice, this was to be roused and made to move up the six *cakras* (like a serpent)— *mūlādhāraṃ, svādiṣṭhānaṁ, maṇipūra, anāhata, viśuddhi* and *ājñā* (supposed to be located in between the eyebrows). The ascension of the energized *Kuṇḍalinī* according to tāntriks, would lead to a blissful structure of a thousand-petalled lotus, and at this stage, there would be the divine union of *Śiva* and *Śakti* as a result of which 'nectar', the supposed fluid of immortality, would circulate in the bloodstream conferring 'deathlessness'. A similar approach which was noticeable among the Taoists though it differed in some details, was based on controlled breathing, meditation, heliotherapeutics, dietetics and even sexual techniques. Some of the Taoists endeavoured to become 'heavenly' or 'earthly' immortals known respectively as *thein hsien* or *ti hsein.* Elixirs of cinnabar (naturally occurring mercuric sulphide), gold, and other minerals as well as plants were also in use for realising this goal. In India, one who practiced intense *prāṇāyāma* and other yogic techniques is supposed to attain superhuman powers and become 'perfestes' or 'accomplished', and he is called a *siddha.*

The Siddhas of Tamil Nadu had ever in sight the goal of attaining earthly immortality. Tirumūlar, one of the eighteen Siddhas, includes in his definition of medicine 'that which ensures immortality'. Siddha medicine means the thoughts and medicinal practices of 18 Siddhas, of whom Nandīsar, Tirumūlar, Agastyar, Bhogar, Rāmadevar, Yūgimunivar and Theraiyer were the noted ones.

In the *rasaśāstra*, mercury (male) is regarded as the reproductive essence of Śiva (male) and sulphur (female) that of his consort variously called Śakti, Devī, Pārvatī and Gaurī. Their divine union as mercuric sulphide was designated as *rasaliṅgaṃ* in the Siddha texts. *Mātṛkābheda tantram*, a tāntrik text, gives the details of how a *rasaliṅga* has to be prepared. Significantly several *rasaśātra* texts are unfolded in the form of a dialogue between Śiva and his consort. More importantly, mercury is also referred to as *pārada* which literally means that which enables one to 'cross the ocean of life'. Its other synonyms are *mahārasa* (great essence), *Śivavīrya* or *harabīja* (semen of Śiva), *svarṇakāraka* (maker of gold transmutation) and *rasendra* (king of essences). The *Rasarastnasamuccaya*, an important text of the 14th or 15th century, asserts that 'he who denies mercury, the creative principle of Śiva, will decay in hell age after age' (I.26)

From elixir alchemy and its presumed immortalizing potential to a new endeavour of iatro-or medicinal chemistry was indeed a quantum jump in India. By about the 11th century, the mythical and esoteric ideas including the 'gold-making' receded to the background. Certain medicinal compositions involving elaborately processed mercury and its compounds, minerals, and other metals, came to the fore. In all of these, a host of potent herbs were also used. The *Mātṛkābhedatantraṃ* emphatically states that even 'mercury cannot be reduced to *bhasmas* (medicinal ash form) without the help of herbs'. Both in the *rasaśāstra* texts and the Siddha works, many plants find extensive application in practically all the recipes leading to the therapeutic compositions. Some of the plants like *jyotiṣmatī (Cardiospermum helicarbum Linn), bhṛṅga (Eclipta alba Hassk); brahma soma (Herpestis monneira); īśvarī (Artemisia vulgaris Linn);* and *kanyā (Aloe indica*

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Linn) were called heavenly medicinal plants. The number of plants or their products mentioned in the *rasaśāstra* as well as in Siddha texts is very large, but a hundred of them have been considered important. Possibly the emphasis of Ayurveda on herbs might have influenced the *rasavādins* (followers of *rasaśāstra)* and the Siddhas as well as their followers to bestow due attention on plants in their medicinal preparations.

The yearning of any person for the methods of rejuvenation and virility of the body lies indeed at the bottom of the endeavours of both the *rasavādins* and Siddha practitioners. Such efforts or goals are not outside the purview of Ayurveda; in fact, *rasāyana* and vājīkaraṇa were among the eight branches of Ayurveda even when it was in its formative stage. They are intended to be promoters of both health and strength, besides increasing intelligence and memory, the maintenance of the youthful state with lustre, and an appealing complexion with resplendent voice, (which otherwise would fade with a person's old age), the modulation of immunity against diseases (*rasāyana)*; enhancing sexual enjoyment, engendering nutritional level in the body and imparting fertility even in old age (*vājīkaraṇa). Suśruta saṃhitā* deals with the composition to be used for increasing longevity and virility. *Soma* as an elixir also finds a place in this text.

There are two main types of *rasāyana: kuṭipraveśika* and *vātatāpika*. In the former, a person undergoes the *rasāyana* procedure in a specially built resort. A sub-type of this is called *droṇī praveśikā* in which a person is required to stay in a boat-shaped bed made of *palāśa* (*Butea frondosa*) and is restricted mainly to a milk diet. The *vātatāpika* is generally for ordinary people (who cannot afford to pay for the first method) and who are exposed to wind and sun during the rejuvenation therapy. There are several rejuvenatting compositions as well as virilization recipes which are by and large herbal. Among the minerals, *śilājatu* (bitumen) is a preferred one. As in the other major treatments of Ayurveda, the *pañcakarma* or the fivefold preparatory procedure is a prerequisite for starting the rejuvenation or virilization process. Even before this, the body of a person is made ready or tuned as it were by oleation (with *ghee* or sesame oil internally, and medicated oils externally) and sudation (subjected to the action of steam over the body except the face and head). According to Suśruta and Vāgbhaṭa, both childhood and middle age are suitable for rejuvenation, the latter being better; autumn, spring and the pre-rainy seasons are considered to be the desirable periods for undergoing *.rasāyana* treatment. There are in the Ayurvedic texts elaborate details about the whole treatment, diet, conduct and the total duration which undoubtedly would discipline both the body and mind. Likewise, for the virilization procedure, there are injunctions concerning sexual habits and steps to be taken for increasing potency.

The Siddha system too has its objective of making the human body strong and healthy through revitalization or conditioning of the body and mind by adopting some procedures which would lead to a youthful state over a long span of one's life. Known as *kāya kalpa,* it comprises (i) yogic *prāṇāyāma* or controlled but rhythmic breathing which is supposed to preserve the vital energy of the human system; (ii) conservation of sperm or reproductive essence; (iii) use of a special preparation called *muppu*; (iv) intake of diligently prepared or calcined powders of mercury and its compound as well as some other minerals; (v) intake of specially processed drugs of prescribed herbs. According to

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Siddha practitioners, the first three methods can be adopted only by yogis and have the potentiality of making their bodies immortal. The last two methods would prolong the life span of ordinary people. Yūgimunivar, one of the reputed Siddhas, states that 'breathing 21,600 times a day is the secret of remaining ever young'.

There is, however, one important aspect of the Siddha system either in its *kāya kalpa* objective or in the efficacy of the mineral or plant medicines, namely, that of *muppu* (which means a blend of three salts). Its preparation is a closely guarded secret even among the Siddha practitioners. Nevertheless, a majority of them accept that *muppu* is made of (i) *pūnīr* (a natural exudate from the soil which has Fuller's earth); (ii) *kalluppu* (either sea salt or rock salt); and (iii) *veḍiyuppu* (naturally available potassium nitrate). The three salts, after their purification with 'sacred' water and juices of some chosen herbs, are subjected to prolonged heating over a low fire of cowdung cakes. Small quantities of purified mercury, its chlorides, sulphur, mica, arsenic sulphides, and other minerals are also subjected to prolonged heating or calcination separately. The resultant powdery product is mixed with the calcined three salts, and to this mixture, a minute quantity of processed gold dust is added. According to Siddha practitioners, *muppu* is of four types: (i) *vāda muppu* (capable of transmuting base metals into gold); (ii) *vaidya muppu* (engendering the efficacy of medicines when added to them); (iii) *yoga muppu* (stabilizing yogic concentration); and (iv) *jñāna muppu* (leading to enlightenment). The *rasaśāstra* texts speak of several salts in their medicinal preparations, but there is no reference to *muppu* in them; Siddha texts, on the other hand glorify it and even today Siddha practitioners invoke the blessings of Śiva-Śakti, the divine energetic union, before they embark upon the preparation of *muppu*, the success of which, they believe, is their therapeutic success.

Tria Prima

The tria prima—mercury, sulphur and salt— have a special position in the Siddha system. Their importance was recognized by Siddhas and their followers even in the 10th or 11th century. In the history of medicinal chemistry, it was Paracelsus (his full name was Aureolus Phillippus Theophrastus Bombastus Von Hohenheim), a Swiss writer in the sixteenth century who tried to modify the Greek theory of elements that had earlier given some credibility to European alchemy through their concept of change—a change of ordinary metals to the noble metal (gold). He advocated vehemently that, apart from the 'four elements' of the Greeks, there were three proximate or interrelated principles, namely, *mercury* (representing the characteristics of metals as well as fluidity); *sulphur* (the power of combustibility and the essence of changeability); and *salt* (the principle of fixity and of resistance to fire). The approach of Paracelsus also ran counter to the four humoral theory of Greek or Greco-Arabic medicine, because he believed that the human body, composed as it is of inorganic or mineral substances, could, in its diseased state, be cured by the administration of mineral medicines. Such a view pointed out the superiority of mineral medicines, of their specificity over herbal medicines of composite character. Moreover, mineral medicines would have the advantage of a longer shelf-life than the

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herbal ones which, because of their biological nature, would lose their efficacy in a short time. Paracelsian ideas stimulated a new impulse among European alchemists to discard their esoteric goal of 'aurifaction' and 'elixir of life' and instead to design their experiments towards the preparation of mineral medicines. In India, the followers of the *rasaśāstra* and Siddha system had already realized the importance of mineral medicines at least five hundred years earlier.

But to prepare mineral medicines from the extremely deleterious or toxic metals including mercury and diverse minerals like poisonous arsenic sulphides, was by no means an easy task. Protracted purification processes, distillation, sublimation and, above all, prolonged heating (*puṭapāka)* for days to weeks had to be carried out in specially designed apparatus. The *rasavādins* and Siddha practitioners spared no efforts in the preparation of such mineral medicines. Of them a group of incinerated or calcined products, called the *bhasmas,* emerged as the efficacious ones, if administered in small dosage with appropriate adjuvants followed by dietary regimen. The adjuvants or vehicles of medicine were regarded as very important especially in the Siddha system which, like the *rasaśāstra,* emphasized proper dietetics.

Perhaps around the 16th century both the *rasaśāstra* and Siddha joined the mainstream of Ayurveda by accepting its concept of *pañcabhūtas* and diagnosis in terms of *tridoṣas.* Siddha, nevertheless, continued to attach importance to pulse and urine examination which, as noted before, began to be adopted by Ayurveda too. Astrological aspects of a patient in relation to his cure seem to be more pronounced in Siddha than either in Ayurveda or *rasaśāstra.* It should, nevertheless, be pointed out that Ayurveda does not regard *rasaśāstra* as its integral part. But in its main framework, the Ayurveda's materia medica includes the *rasaśāstra's* mineral medicines like *bhasmas*. Siddha medicines, on the other hand, have their own identity, appealing to Tamil people. Nevertheless, in Tamil Nadu and its adjoining areas where Tamils live in considerable number, Ayurveda and Unani are also popular.

Yoga

A close examination of the three systems will not fail to reveal that the foundational ideas of Ayurveda are those of the Saṅkhya, Vaiśeṣika and Nyāya.They are not noticeably cast in a tāntrik framework, albeit Ayurveda's *bhūta vidyā* (psychiatry and demonology) associated with charms and propitiatory rites which have some tāntrik approach. Siddha, on the other hand, has derived its inspiration from *yoga* and believes in the nature of the 'tāntrik human body'. Its anatomical knowledge is in the nature of a supposition that the human body is composed of 7200 veins and nerves, seven vital nerve centres, ten vital airs (*prāṇa)* and ten vital pulses (*nāḍī)*. Three of the vital pulses are *Iḍā, Suṣumnā* and *Piṅgalā* of tāntrik parlance. The concept of *prāṇa* encompasses the ideal 21,600 respirations a day distributed over the seven vital centres in the body: *mūlādhāra (600); svādhiṣṭhāna (6000); maṇipūram (6000); anāhatam (6000); viśuddhi (1000); ajña (1000);* and cerebrum (1000)-all in the tāntrik ensemble and in the realm of yogic practices.

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The *Caraka saṃhitā* states: 'Happiness and misery arise due to the contact of self, sense organs, mind and the sense objects; but when the mind is steadily concentrated on the self, both cease to exist due to non-initiation and a supernatural power comes forth in the person. This state is known as '*yoga*' by the expert sages'. (*Śārīra*, 138-139). He points out that all sensations cease and have no existence of their own in the state of yoga and *mokṣa* (emancipation). Caraka also refers to the eightfold supernatural powers which a devoted *yogi* could attain in a way similar to those indicated by Patañjali, the author of *Yoga sūtras*. But they are not exactly identical with the *aṇimādi aṣṭasiddhis*. According to Caraka: 'Entering an other's body, knowledge of an other's mind, doing things at pleasure, supernatural vision, superhuman hearing, superhuman memory, brilliance, and disappearance at will -these eight are stated to be the supernatural powers of yogins—All this is possible due to the concentration of a pure mind' (*Śār*. I. 140-141). He calls them the '*aiśvarya*' and not the eight *siddhis*. The *siddhi* postulate, it would appear, appealed to the *rasavādins* as well as to those who aspired to become Siddhas in the earlier stages of their esoteric practices. One of the supernatural powers, flying in the air, is referred to in some of their texts while extolling the miraculous powers of mercury.

Nevertheless, the eight methods described by Patañjali namely, (i) abstinence (*yama*); (ii) observance (*niyama*); (iii) posture (*āsana*); (iv) regulation of breath (*prāṇayāma*); (v) withdrawal of senses (*pratyāhāra*); (vi) fixed attention (*dhyāna*); (vii) contemplation (*dhāraṇā*); and (viii) absolute concentration (*samādhi*), have the potential of forging harmony among body, senses, mind and intellect. The human values associated with *yama* like non-violence, non-possession, truthfulness and celibacy would have an exalted effect on an individual's life leading to psychosomatic harmony. The yogic *āsanas*, besides being in the form of a physical culture or catalysing the physical and physiological processes, would attune the body-mind ensemble also, leading to total health free from stress and tension which undoubtedly disturb the normal physiological processes in the body. The *āsanas* would, in addition, recoup or regenerate the vital organs of the body and energize their functions so that they act in tandem, thus fortifying physical and mental health alike.

Caraka speaks of the tripod of life—mind, self and body. He also explains the happiness or unhappiness of an individual as well as the body-mind harmony in terms of human values and individual qualities. Yogic practices are of great relevance to the maintenance of one's health in a state of dynamic equilibrium of the physical body and the psyche integrated with it. Of late, the effect of the yogic *āsanas* and *prāṇāyāma* has been scientifically studied. It has been observed that if one practises these regularly, one could normalize the vitiated factors and the functions of digestive power (*agni*). Six months of yogic practice are found to reduce neuro-humours and increase within physiological limits the hormones and others, like thyroxine, cortisone and testosterone. Blood sugar and serum cholesterol levels have been observed to decrease. Clinical trials on 1200 patients with several types of stress diseases such as hypertension, bronchial asthma, diabetes, anxiety neurosis and migrane, have shown that with appropriate yogic practices over a stipulated time, nearly 70% of the cases resulted in marked improvement. In the earlier stages of such diseases, the improvement would be much more if the

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patients undergo yogic therapy. In all of these, however, the equipoise of mind, dietary regimen and control of the senses play a decisive role (Udupa, p.430).

The Colonial Period

In the colonial ambience, Ayurveda, Unani, and Siddha ploughed their weary way. Nevertheless native kings and chieftains encouraged them here and there. In colonial Goa (16th century), Garcia da Orta, a Portuguese physician, who was rather critical of native vaidyas, undertook an extensive study of local medicinal plants and drugs. There was an exchange of medical practices among some Portuguese doctors and local physicians, but in an incipient way. With the establishment of British rule in the middle of the eighteenth century, although the indigenous systems suffered a setback, their role in the medicare of the vast rural masses was not insignificant. Yet they chose to move along the already charted grooves and there was little or no attempt by the native physicians at improvising either their ideas or practices. Tradition dies hard in India and the indigenous medical tradition found it even harder to accept into its fold the new scientific medicine introduced largely by the British colonial masters.

But the traditional medicine systems of continued, specially Unani. There were two distinguished families—the Sharifi and the Azizi families, the former in Delhi, and the latter in Lucknow. They were well known particularly is this field. One of the most learned and successful physicians during the regin of Muhammad Shah, Hakim Muhammad Sharif Khan (1722–1804) wrote several authentic treatises on Unani. His sons and grandsons were the torchbearers of the family tradition and some of them were honoured by the colonial British Government in recognition of their medical services. Hakim Muhammad Khan, one of the four sons of Hakim Sharif Khan, had three sons : Hakim Abdul Majid Khan, Hakim Wasil Khan and Hakim Ajmal Khan. Majid Khan founded in Delhi a *Tibbi Madrasa* (1899) for teaching Unani which was later developed into a Tibbi College by his brother, Hakim Ajmal Khan. Wasil Khan established the Indian Medicines Company (a pharmaceutical works), which is now well known as *Hindustani Dawakhanah*, in the establishment of which Ajmal Khan played a key role. Ajmal Khan, also a noted poet both in Persian and Urdu, was a pillar of strength for the promotion of Unani teaching. He established a Tibbiyah school for women called *Madrasah-i Tibbiyah-i-Zananah* in Delhi which was inaugurated in 1908 by Lady Dean, wife of the then Governor of the Panjab province. On his initiative and financial support drawn mainly from the *Hindustani Dawakhanah*, the foundation stone for Tibbiyah College was laid in Karol Bagh (Delhi) in 1916 by Lord Hardinge, the then Viceroy of India. Five years later, this College was inaugurated by M.K.Gandhi who was then spearheading the freedom movement on his return from South Africa. In 1926, Ajmal Khan's foresight led to setting up on modern scientific lines a Research Department on Indian Herbs in Tibbiyah College. He himself conducted investigations on a medicinal plant called *Asyol* (*Ranwolfia serpentina; sarpagandha* in Sanskrit). Some of the active principles of this plant have been named after him : *Ajmaline, Ajmalaline, Isoajmaline* and *Neoajmaline*. It may be noted that

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even today medicinal formulations incorporating the products of *Asyol* are being used successfully for treating nervous disorders as well as hypertension.

Hakim Ajmal Khan was honoured by the British Government with the title *Hadhiqal-Mulk* in 1907. But the Hakim renounced this title after the First World War in protest against the atrocities committed by the British military in Islamic countries. In appreciation of his spirit, the Muslims themselves confered on him the title Mashal-Mulk in 1921. The Sharifi family of Hakims enjoyed a position of distinction in Delhi.

An equally famous family of Unani physicians in Lucknow was the Azizi family of Tabibs. It owed its name to Hakim Abdal-Aziz whose ancestors hailed from Kashmir. Born in 1855, Aziz was an authority on Ibn Sīnā's *al-Qānun* and combined his medical practice with teaching. He established a medical school in 1902 at Jhawai Tolah (then in United Provinces) called *Madrasah Takmil ad-Tibb,* and equipped it by spending his own resources, besides teaching there. Surgery (1902) was also introduced as one of the subjects and a small hospital was attached to this school for practical instructions. Later it become a College which has maintained its reputation even now as one of the best Unani medical institutions. A noted member of the Azizi family, Hakim Hafiz Abd al-Wali was an active member of the All India Ayurvedic and Tibbi Conference which had been founded by Hakim Ajmal Khan.

The two brothers, Hakim Abdul Hameed and Hakim Mohammad Said, the two sons of Hakim Abdul Majid of the Sharifi family of Delhi, have been fostering the great Unani tradition in India and Pakistan respectively. The enchanting Hamdard institutions in Delhi owe their origin and development to Hakim Abdul Hameed who even till his ripe old age had been nurturing them with exemplary missionary zeal.

There were Ayurvedic families too in different parts of India patronized by the Maharajas. However they did not appear to have made any attempt to institutionalize teaching and research in Ayurveda in the manner in which the Unani families did. It was only after Independence that the Ayurveda and Siddha institutions came up largely with the support of the State and Central Governments.

NEW AGE AYURVEDA

In the early medieval period, Ayurveda had found its adherents, as noted before, in the area of Islamic culture. Through the medium of Muslim medical men, its materia medica, its concepts and practices had reached Latin medieval Europe. At home in the medieval period Ayurveda and Unani were also active—a continuing complementarity even now since Independence. Over the five decades both have had their influence outside India, Unani mostly in the Islamic countries, and Ayurveda in several parts of the world as an alternative system of medicine. This status of Ayurveda has become possible largely because of the devoted efforts of several eminent men, Indians and foreigners alike. The latter, after studying Ayurvedic texts, have become convinced of the holistic health care and the efficacy of Ayurveda in situations of stress, debility and chronicity of diseases, Maharishi Mahesh Yogi whose name is synonymous with Transcendental Meditation (TM) has been doing yeoman service in popularizing Ayurveda, specially in the USA and

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Europe. Many a herbal compound of what is branded as *Maharishi Ayurveda* have been examined pharmacologically and clinically in USA. Some of them have shown positive results. The periodic orientation courses that are being conducted by Mahesh Yogi for modern doctors have enabled them to find in Ayurveda a vast potential of health care. A non-resdient Indian in the USA, Deepak Chopra, who joined the movement of Maharishi Ayurveda initially, has established himself as an emissary of Ayurveda. His books on Ayurveda are among the best selling in the World. He has earned for himself the name of *New Age Guru* or *Power Guru*—a new power of health with a new inner light. To quote from his publication: *Perfect Health: The Complete Mind/Body Guide* (which has run into several editions): 'The purpose of Ayurveda is to tell us how our lives can be influenced, shaped, extended and ultimately controlled without interference from sickness or old age. The guiding principle of Ayurveda is that the mind exerts the deepest influence on the body, and freedom from sickness depends upon contacting our own awareness, bringing it into balance, and then extending that balance to the body. This state of balanced awareness, more than any kind of physical immunity, creates a higher state of health. Blending Ayurveda and western medicine brings together ancient wisdom and modern science—and the two have proved completely compatible' (pp.6-7)

Institutions for Ayurvedic studies and practices have come up in several countries—USA, Canada, Germany, the Netherlands, UK, Switzerland, Italy, Australia, Japan and South and South-East Asian countries like Bangladesh, Sri Lanka, Bhutan, Nepal, Burma, Thailand and Indonesia. Mauritius in which a large number of people of Indian origin live has been promoting Ayurveda in a remarkable manner.

Ayurveda is a product of human mind. There is always a struggle within the human mind between its sensorial ephemerals and transcendental experience, between the desires of its inseparable associate (the body) and the need to overcome their deleterious effects as and when they arise by restoring the mind—body balance or harmony. This is one of the most enduring foundational ideas of Ayurveda. From its beginnings about 2500 years ago in India, Ayurveda has traversed a long way in both space and time. But its basic concepts and practices which have remained practically unchanged are as relevant now as they were before. Its approach to man and nature is its forte; its unitary conception of *mind-body-food-drug* is its sustenance, and its philosophy of complete health is its assured success.

The canvas of Ayurveda was indeed wide encompassing as it did in its totality plant and animal life, the *Vṛkṣāyurveda* being concerned with the former, while the *Hastyāyurveda, Aśvāyurveda* and *Gavāyurveda* with elephants, horses, and bovine animals respectively. Ayurveda, therefore, emerged as the science of life in its diverse forms, and its medical armamentarium though comprised largely of plant extracts, also included some animal products.

In the Indian tradition, plants and animals have been accorded a distinct position, some of them having been raised to a divine level.Even now people in different walks of life offer workship to what have been known as sacred trees and plants like *aśvattha* (peepal), neem and *tulasī* (*Ocimum sanctum*).On special days they are ceremoniously worshipped and circumambulated with devotion. Animals like bull, cow and serpent are

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also worshipped, cow being regarded as the most sacred animal. It is common knowledge that each Indian god has some animal or the other as its vehicle and is offered flowers and plant leaves, thus emphasizing the innate relationship between the divinity and the various forms of life of which man is an integral component. Life science in India has never been a circumscribed branch of knowledge, but a transcendental one, an integral part of the holistic view of life.

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CHAPTER 1

Vedic Medicine: Some Aspects

Mira Roy

The early period of Indian medicine is generally referred to as the period of Vedic Medicine, since it is based on the concepts and practices dealt with in what has come to be known as Vedic literature, specially the *Atharvaveda.* It related to the human body, its anatomy and physiology, childbirth, various diseases and their cure. The period of the composition of the Vedic texts including the Upaniṣads was c.1500-700 **B.C.** Pre-eminently a religious one, this vast literature also provides an insight into the life of the people of that time along with religious practices and philosophical discourses, or questions of creation and the like. In this chapter, Vedic medicine is presented with reference to three aspects: (*i*) religion; (*ii*) plants; and (*iii*) diseases. To begin with, it is essential to understand some aspects of Vedic religion itself to appreciate specially the role of plants in the cure of diseases.

RELIGIOUS ASPECTS

Vedic religion aims at attaining worldly happiness through the appeasement of several gods or divinities whose imagery was in relation to different natural phenomena. The three basic aspects of Vedic religion comprised (*i*) certain cosmic concepts like *Dyaus* and *Ṛta* (*ii*) Fire (*Agni);* and (*iii*) Soma cults: *Dyaus,* the creator or primeval father, *ṛta,* the cosmic law; *agni*, heat or energy (fire) and food (*Soma*). In the Vedic ideology, there was also a hero-cult which was developed later as a protective measure against all dangers of life including diseases encountered by the people migrating into the land of seven rivers. These aspects of Vedic religion are reflected to a great extent in the Ṛgvedic *mantras* as well as in the sacrificial formulae in different texts of the Yajurveda. In course of time, religious belief was blended with magic (which was generally associated with the fire-cult), thus giving prominence to incantation in the place of invocation to the gods for the attainment of worldly happiness. This eventually resulted in the Atharvavedic religious medicinal practices.

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In the Vedic pantheon, the spirits of all worldly objects were given the state of godhood. Plants had a particular place of reverence and diseases were spiritualized. Certain divinities were even attributed to different states of the human emotions, like anger (*manyu*), faith (*śraddhā*), ardour (*tapas*), devotion (*bhakti*), and love (*kāma*). The priests played a pivotal role in establishing a communion, as it were, between the gods and mortals. They were regarded as having the power to subdue even the gods, and invite or ordain them to the sacrificial altars and enjoy oblations along with the sacrificers. This power of the priests connoted in a way the magical power which was supposed to be with all priests, and such a power inclusive of healing, resided in the utterance of syllabic sounds of *mantra*. The priests were thus also the physicians. The Aṅgirasas were a group of specialized priests for performing healing rites, developed in the period of the Atharvaveda. Sacrifice and magic were thus the two components of the Vedic religion which was nature-based, but mythology-oriented, as in the other ancient religions of the world.

Cosmic Concepts: Dyaus and Ṛta

Dyaus: Dyaus in the Vedic pantheon denotes sky or more especially 'shining sky' in contrast with Varuṇa who represents 'night sky'.[1] The Ṛgvedic Dyaus is stated to be the infinite and presonified sky and the abode of rain.[2] This conception was also the oldest religious ideology of the Indo-European mythology. Dyaus is also represented in the Greek mythology as Father Dyaus (Zeus) and *Dyaus pita* (Jupiter). Dyaus as god was either coupled with different godheads specially with earth, *Pṛthvī* or *Pṛthivī*, known as *Dyāvā-Prthivī*, a two-in-one deity in Vedic religion. To them were attributed the powers of creation and hence they were the primeval parents.[3] Their special activity was related to rainfall as the *Taittirīya saṃhitā*[4] refers to the sky as bestowing rain, and therefore fertilizing the earth . Thus they both sustain life on earth, one by rain and the other by germinating food-seeds.[5] More importantly, in the *Āyuṣyāni* rites, *Dyaus* is invoked for imparting long life with a good respiratory system.[6] It may be noted that *āyuṣyāni,* i.e., prayer for long life, constitutes one of the two branches of treatment for long life and the cure of various diseases.

Ṛta: In consonance with the conception of Dyaus is that of *Ṛta* or (Cosmic Law) governing the proper functioning of cosmic process. This concept does not seem to be original to the Vedic Aryans, but a common belief of the Indo-Aryans. The term *Ṛta* has resulted from *ṛ* (to go) plus *ta*. This gives also another form, *arta*. The first was retained in India and the second in Iran as *urta/ arta/ aša*.[7] The Vedic *Ṛta* covers three phases: (*i*) physical order of the universe; (*ii*) due order of sacrifice; and (*iii*) the moral law.[8] *Ṛta* in the sense of moral law was conceived as a binding medium against 'sin' and Varuṇa's supremacy was recognized in guiding this aspect of *Ṛta*. In any case, the idea of keeping the wheel of cosmic sacrifice ever in motion as well as the moral law had a distinct position in the Vedic thought structure. Interestingly, *Ṛta* along with the Sun is referred to in a charm for warding off of the disease called *kṣetriya*.[9]

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Fire-cult

Agni was the personification of the natural element of fire on account of its close relation to human life. It was regraded as a terrestrial god and as the son of Dyaus and Pṛthivī. Agni's threefold birth is lauded in the Ṛgvedic hymns: as the Sun in Heaven; lightning in the aerial region and vegetation on the earth.[10]

The tradition of fire-worship goes back to the early Iranians from whom the cult was transmitted to the land of seven rivers by the migrating Aryan people. However, no specific term indicating fire or fire-cult appears to be available in the *Avesta,* and Agni even as a divinity or a god is not mentioned among the Mitanni gods. The worship of Agni in the way it is presented in the *Ṛgveda,* is therefore a specific development on the part of Indian priests and this has no parallel in the other ancient religions. In the *Avesta,* fire is presented as the centre of an elaborate and developed ritual. A close identity however, is noticed in the term, *Athara-van* as fire priest in Indo-Iranian religion and the *Atharvan* of the Vedic religion meaning fire priest.[11]

The fire-cult began with the installation of domestic fire by every householder. This prevailed among all the Indo-European communities particularly by Indo-Iranians. The necessity of worshipping domestic fire was strongly felt obviously in the cold climates. In India, a place with a tropical climate, emphasis was laid not on domestic fire, but on sacrificial fire which was the Vedic Aryans' own religious distinctiveness. Keith states: 'the sacrificial fire became more important in a land where the Sun provided for many things which elsewhere fire was required to accomplish'.[12]

Fire worship seems to have been performed for solemnizing an occasion apart from its necessity for protection against evils and the removal of impurities which would make the sacrifice impure.

Agni is considered as Aṅgiras and Aṅgirasas, the fire worshippers, emerged as the ancient priestly class. According to Hillebrandt, the Aṅgirasas were a real historical family associated with the fire-cult. The term, *Aṅgirasa*, is an inverted cognate from the word *Agni*. The suffix *ra* added here has the sense of *has*. Thus Aṅgiras is an epithet of Agni. In the *Ṛgveda,*[13] Agni is described as the first or the primal Aṅgiras, the most inspired among them and even the highest among all the Aṅgirasas. A large number of statements in the *Ṛgveda* highlight Aṅgirasas as the propounders of the Agni- cult in Vedic India. The *Taittirīya saṃhitā*[14] corroborates this fact by explicitly stating that Aṅgirasas were the founders of the fire-cult in India. Further, the term, Aṅgiras, is of Indo-European origin, its Greek cognate being *angelos,* meaning a messenger. It is interesting to note that in the *Ṛgveda*, Agni is introduced as an envoy or a messenger between the divinity and the sacrificer.

Likewise, the term, *Atharvan*, conveys the meaning of 'one who has Agni', i.e. a priest, the follower of the Agni-cult. The word, *Atharvāṅgīrasa*, a compound showing a foreign word combined with its native synonyms, is indicative of two classes of fire-worshippers who were noted for their performance of holy and black magic respectively. The other priests of the fire-cult were the Bhṛgus, and the task of a Bhṛgu priest was to keep the fire from extinction. Atharvan, Aṅgiras and Bhṛgu were, therefore, the three categories of priests associated with fire-cult. Significantly these three were the authors of

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the *Atharvaveda* which, along with its priests, was presumed to be originally a part of the fire-cult as distinguished from the parallel Soma-cult[15]. More importantly they were also praised for their healing powers through magico-religious rites.

It may be noted that the *Atharvaveda* is an important repository of early knowledge on the human body, its ailments and their possible cure—medicinally or magically. Its closeness to the fire-cult testifies that the custodians of medicinal knowledge were primarily the priests, the followers of the fire-cult.

Soma-Cult

On the other hand, the Soma-cult or which centred around the plant Soma, appeared to have been evolved in the Balkh region where the plant grew on the mountain called Mujavant to which Soma was always related. Central to this cult was Soma-juice which was offered as a libation to the gods, a ritual common to both the Indo-Iranians and the Vedic Aryans. In the initial stages, the property of Soma was recognized by the proto-Avestan-Vedic community not only as an energizing and exhilarating drink but also as an inflammable one to keep the fire alive. In the Vedic pantheon, fire was consecrated with the juice of Soma as clearly indicated in the *Śatapatha brāhmaṇa*[16] as follows: 'Agni is the body (the recipient) and Soma is the life-sap (the soul-donor) and hence the body is supplied with the life-sap from end to end'. This is also reflected in Macdonald's observation:[17] 'The Soma juice was poured into the fire and thus infused immortality upon Agni and by so doing the worshippers acquired it themselves. Agni and Soma were thus the two inseparables representing two natural phenomena : Light and Moisture, upon which is based the Universe'.[18]

Soma is *Haoma* in the Indo-Iranian dialect. The root verbs of the two are *Su* and *Hu*, meaning to 'pound', to 'squeeze' and thus possibly signify a plant, the juice of which was extracted by squeezing.[19] Soma has been described as a rain-nurtured plant and is stated to have grown in a 'thousand boughs' in 'reed forms' or 'stalks having sharp arrow-like points', 'yellow, ever-green and golden hued'.[20] Its habitat, morphology and some properties, particularly its intoxicating elements, according to some scholars, show the traits of Ephedra in Soma.[21]

The nucleus of the Soma-cult appears to have been the region in which the Soma plant was available and was then employed as an important sacrificial ingredient. But the concept of Soma itself appears to have undergone a change when the rudimentary Soma-cult became ritualistically elaborate at the hands of the priestly class, leading to an extensive Soma ritual as an integral part of the Vedic religion. This possibly happened when the Aryans settled down as agriculturists. The various Soma aspects of the *Ṛgveda* (*Maṇḍalas* II-VIII) were eventually put together in the IX *Maṇḍala* which served as a handy liturgical *Book of Prayers* as it were, for the performance of Soma sacrifice by the priestly class.

Soma was dear to the Aryans, who not only deified it but even imagined it in different forms.[22] Several attributes as eulogies to Soma were an outcome of a deep sentiment towards it. The *Nirukta* mentions two forms of Soma: terrestrial and celestial,

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the former being of the plant kingdom and the latter in relation to the Moon and the nectar of immortality. In course of time, a complete unification of Soma as plant and Soma as Moon was envisaged in the rituals of Soma sacrifice. This is evident in the ceremony of *Agniṣṭoma* consisting of the offering of the Moon's rays (which were regarded as being full of nectar) to the gods through the shoots of the Soma plant. It was believed that drinking of Soma juice by the votaries after offering it to the gods would make them attain immortality, radiant and divine.[23] This idea of immortality or prolonging the life span relating to Soma juice found its way into the Ayurvedic medical classics in the form of a special therapy called the *Rasāyana* for rejuvenation and prolonging life mainly with the aid of potent herbal juices.

In a general way the Vedic Soma was also regarded as a bestower of rain and light as well as food. Further, the Vedic texts, particularly the *Atharvaveda,* speak of Soma even as a panacea for all ills.[24] It had also acquired a pre-eminent position as a joint-deity with Indra, Agni, Pūṣaṇ, and Rudra. It should, however, be noted though that Soma has been praised by the priestly class attributing to it different names like Bṛhaspati, Apāṁ-napāt, Varuṇa, Yama, Nārāśaṃsa, Tvaṣṭar and Viśvarūpa, there is no description of Soma as a god itself in any of the Vedic texts. The reason for this in the words of A.B.Keith[25] is ' Soma resembles Agni; in fact that anthropomorphism of the god is constantly coming into collision with the actual form of the plant and thus is prevented from attaining any clear development '. In any case, with Agni, Soma was the god of ritual. It would appear that Soma was considered as an alien plant and for this reason it was called *atithi* (guest). Its popularity began to wane during the post-Ṛgvedic period perhaps due to the scarcity of the plant in India. However, the plant-cult or the veneration of plants which was initiated in the name of the Soma-cult, assumed a new meaning in relation to certain plants to which extraordinary medicinal-cum-magical values were attached during the period of the *Atharvaveda.*

Vedic Gods

Centring around the aforesaid four cults emerged the conception of different godheads, as representing the natural phenomena and their worship through *mantras* and sacrifices signified the worship of nature. As noted before, the Vedic gods were of three categories: celestial, aerial and terrestrial, governed by three principal godheads; Sūrya, Vayu or Indra and Agni respectively.[26] There were also semi-principal celestial deities like Varuṇa, Mitra, Āditya, Aryaman, Pūṣaṇ, Viṣṇu, Aśvins, Ūṣas; the aerial gods like Marut, Parjanya, Rudra and Bṛhaspati, while Soma was in the terrestrial category. Besides there was Dyāvā-Pṛthvī, Tvaṣṭar, Ṛbhus and a number of other deities of lesser importance.

The Vedic hymns reveal the respective physical traits and other attributes of gods. But of relevance to us is that, along with the multifarious activities of gods, their prominence as healers of diseases was also recognized. For example, Bṛhaspati, extolled as a form of Agni, is described as the Lord of medicinal plants. The pre-eminence of gods as being proficient in medical and surgical cures of the diseases will be discussed later in this chapter.

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Yajña (Sacrifice)

There is another important dimension of Vedic medicine which merits attention. *Yajña* or sacrifice was principally aimed at controlling as well as being in harmony with nature and the attainment of worldly happiness through the appeasement of gods who in reality, as noted before, were different natural phenomena. The sacrifice generally consisted of the performance of rites, and recitation or singing of hymns by the priests on behalf of a supplicant. Thus it was just the opposite of the magical approach as represented by the shaman (wizard) employing charms for a direct control of nature, and through it, of the cure of ailments.

Vedic sacrifices were of two types: (i) major collective sacrifices known as *Śrauta-Yāga* (twelve in number, three of which are most elaborate, viz *Aśvamedha, Agnicayana* and *Soma* sacrifice); and (ii) singular ritualistic/ ceremonial performance meant for specific purposes, which gradually became a characteristic of the Atharvavedic religion. The rites were generally expiatory or beneficiary types and were intended as a means to combat evil spirits which were supposed to be causing diseases and other distresses of life. On the whole mysticism, symbolism and magic spells formed the different ritualistic constituents of *Śrauta* sacrifice,and the cure of diseases was also sought in this matrix in a primitive way.[27]

It should be noted that the sympathetic or imitative magic was followed later to a great extent in the rituals relating to the treatment of diseases. Alongside, Varuṇa's pre-eminence in dispelling diseases due to sin was well recognised as attested in a number of hymns. It was believed that the hymn, composed in praise of Varuṇa, if chanted, never let anyone suffer from any disease.[28] In other words, the Varuṇa hymn was in the nature of a charm against diseases. Generally, evils were sought to be dispelled through the use of amulets, charms, and spells. More importantly, certain plants like *apāmārga* were considered as the most effective agents in this respect.[29] Metals too, particularly lead, were regarded as having the potential for dispelling evil spirits.

PLANTS

The cult of Soma in Vedic religion, as noted earlier, is essentially the cult of vegetation, Soma having the appellation of the Lord of Herbs. According to the Vedic idea of creation,[30] plants like other phenomena, appeared ages before gods, and plants were not only deified for the well-being of humanity, but also invoked along with water and air for making the world honied or pollution-free.[31] As a result, in every sacrificial performance, plants and water were hailed. The felling of forest trees was prohibited.[32] Not only was special oblation recommended for the worship of trees but even every part of the plant was praised during the sacrificial performance.[33] The Vedic seers imposed human traits also upon the plants. A beautiful *mantra* in the *Ṛgveda* speaks of plants conversing among themselves about the medicinal properties which they had inherited from Soma, the king of plants.[34]

The primary needs of life which the Indo-Aryans felt during their migration, perhaps from the Balkh region to Indian soil, were food and medicine on the one hand and, on

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the other, the destruction of their enemies. In this respect plants played their own role.[35] Soma, representing the entire vegetable kingdom, was recognized as food as well as medicament and the Soma sacrifice was of great relevance to the Vedic people.[36] In any case the importance of plants has been sung extensively throughout the *Saṃhitās,* particularly in the *Ṛgveda* and in the *Atharvaveda*.[37] Numerous are the origins of medicinal herbs according to the Vedic *ṛṣis*; the *Ṛgveda*[37a] states that plants have 'hundreds of places of origin, thousands are their growths and they are endowed with a thousand (i.e. manifold) powers to cure diseases'. It is interesting to note that for tracing rare and sacred plants, certain birds of keen sight were employed.[38] It is to be emphasized that in the Vedic art of healing, one having a deep and extensive knowledge of the medicinal properties of plants, was regarded as a physician, friend as well as chaser and slayer of disease.[39]

Medicinal Plants

Oṣadhi and *bheṣaja* are the two terms used in Vedic literature for medicinal plants, though *oṣadhi* is indicative of medicine as well as plants in general. Bṛhaspati, the deity who presided over *mantras* or spells and charms for warding off diseases of various types, was regarded as the propagator of *oṣadhis*. The *Ṛgveda* states that 'heaven is the place of origin of the *oṣadhis,* from where they flew earthward for the benefit of all living beings, both animals and man, so that they are devoid of maladies', and that 'Bṛhaspati is the highest authority on medicinal plants'.[40] There were, however, other sages who represented different schools of herbalists, as exponents of particular medicinal plants demonstrating their healing or healing-cum-magical powers or their physical characteristics and habitats: Aṅgirasas, Śāmbu, Jāmadagni, Kaṇva and Kaśyapa are the five sages who have been stated in the Vedic literature as having proficiency or expertise in discovering new herbal drugs with their specific curative properties.

Aṅgirasas: The Aṅgirasas, who like Bṛhaspati were renowned herbalists, had a tradition of demonstrating even the potency of a plant drug. Among the medicinally efficacious plants, those introduced by the Aṅgirasas were believed to have been highly beneficial and comforting to the patients.[41] ***Śāmbu*** was a sister school of the Aṅgirasas and this is implied in a statement thrice from Sāmbu and thrice from Aṅgirasas in the *Atharvaveda*[42] regarding the origin of the plant, *Kuṣṭha*. Śambavya, the patronymic of Śambu, was a school-name of *Sautra śākhā* and the *Sāmbavya gṛhyasūtra*[43] is a version closely related to the *Sāṅkhāyana-gṛhyasūtra*. ***Kaṅva*** was the sage par excellence in the demonstration of herbal drugs,and was credited with the discovery of the medicinal properties of the plant, *apāmārga*, which significantly was known as Kaṇva's plant, thus emphasising the pre-eminence of this school.[44] ***Kaśyapa*** *or Kaśyapas* were the Sun-worshippers and the discovery of the plant, *sraktya* (*tila, Sesamum indicum*) is attributed to them.[45] ***Jāmadagni*** was another sage who was believed to have developed a very potent drug from a plant of luxuriant growth called *nitatnī* (because of its long roots in the soil) which was supposed to have the property of curing disease of the hair. He is also stated to have used this plant for promoting the growth of his daughter's hair.[46]

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Naming of Plants and Classification

The plants, being also hailed as *mother,* have been grouped in a bond of family relationships.[47] The naming of a plant was also done in some cases on the basis of the desired result for which the drug was administered. A notable fact is that the names of 'mother' and 'father' of the plant are also imagined in conformity with the colour of the principal plant with a view to emphasizing the properties of a plant to cure a disease manifesting itself in the opposite colour. This is evident in the case of *Āsurī,* a dark plant, for the cure of (white) leprosy. To stress the pedigree of plants, the name of their 'mother' and 'father' are indicative of even the colour of the main plant. It may be noted that the 'mother' here stands for soil which is black, and the 'father', suggestive of the seed is also black in colour.[48] In some other cases like *Kuṣṭha,* the naming of family members of the seed is also based on its properties.[49] Another plant *varaṇa* indicates 'that which shuts out' (diseases), and *trāyamāṇa*, yet another plant, connotes its property, namely, that 'which protects'.[50]

Generally plants were divided into four major classes: *Atharvan* (holy), *Āṅgirasa* (magic), *Daivī* (divine) and *Mānuṣī* (those born of men).[51] More practically in the Ṛgvedic period, a large number of plants were grouped under fruit-bearing; non-fruit bearing; flowering and non- flowering.[52] In the period of the *Yajurveda,* the grouping into *Akośa* (podless, i.e. non-leguminous plant) and *Keśinī* (tufted, i.e., grass group or *Graminaea* family) undoubtedly speaks of an advanced state of knowledge of plants and plant life at that time.[53] It may be noted that the *Ṛgveda*[54] has categorized medicinal plants on the basis of their properties also. These are: *Aśvavatī* (herbal drug for virility); *Somavatī* (life-prolonging drug or drug for immortalization); *Ūrjayantī* (drug to cure general ailments of human body); and *Udojasa* (effective or powerful drugs for diseases). The *Atharvaveda* goes a step further and gives a classification of plants combining morphology, mode of growth and their medicinal properties.[55] This text has made a broad division of plants according to their curative properties as follows: (i) food plants, especially rice and barley (as also 'food of Agni or fire'): (ii) aquatic plants; (iii) perennial plants. (described as those 'which grow ever renewing themselves'); (iv) fixed trees that 'bear a thousand names' meaning different species. Creepers, grain-creepers, weeds (*āla*) and other species.[56] were also known, though it would appear that there was no specific classification for them.

A host of medicinal or medicinal-cum-magic plants has been dealt with mainly in the *Atharvaveda. Asuras* or demons who were regarded as enemies of gods in heaven and Aryans on the earth were presumed to possess the wisdom to detect medicinal virtues of plants, which have been described in the *Atharvaveda.* An interesting aspect is that a particular type of ants (regarded as 'daughter' of *asuras*')is stated to have the power to dig out the remedy for poisoning and also for curing certain unhealthy discharges.[57] The *Asuras,* who were supposed to be secretive in the matter of disclosure of their knowledge to their rivals, used to deposit medicinal plants in the soil and these were dug out by the gods or the sages in case the plant was in the divine category. Thus, *Pippalī* (black pepper, *Piper longum),* a medicinal plant of high repute, is said to have been buried in the ground by *Asuras,* but later the gods reared the plant again for the benefit of the sick.[58] The plant,

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Nīli (*Indigofera indica*), was named *Āsurī* (Asura woman), and as a curative drug for leprosy.[59] Even today leprosy cases apply indigo on the leprous spot, a fact bearing evidence of an unchanged medical tradition continuing from the Atharvavedic period up to the present.

Natural instincts of some animal species such as the boar, mongoose, eagle, *raghatas* (falcons), swans and other wild beasts which would go in search of healing plants were given due importance and made use of.[60] Alongside, herbs were used for healing diseases of animals and, in this context, such herbs were also praised. Most of the healing plants were also believed to have magical powers. Vedic medicine being a combination of both medicine and magic, plants were used not only as medicines but also as amulets (*maṇi*). The *Atharvaveda* extols the efficacy and power of an amulet made of certain herbs thus: 'Tiger-like is the amulet (made of) herbs, a saviour, a protector against hostile schemes: may it drive off far away from us all diseases and *Rākṣasas*'.[61] There were plants for exclusive use; a plant called *Jaṅgīḍa* (*Terminalia arjuna*?) known for its high curative potency, was exclusively used as an amulet.

Some Important Medicinal Plants in Atharvaveda

The following plants of medicinal value, as described in the Atharvaveda, deserve special mention (their medicinal uses and references are given in brackets). *Alasāla* (grain of a creeper; a remedy for eye diseases—VI.16.4); *Añjana* (not identified botanically; for general healing and for longevity—XIX. 44.1); *Apāmārga* (*Achyrenthus aspera*: a remedy for hereditary diseases, and for increasing fertility—IV.17.6; 18.7; 19.5.7); *Arundhatī* (*Sahadevī;* for increasing the yield of cow's milk and also for the general health of cows and other animals, particularly horses; protection of cow-stall from defilement or curses; for the cure of wasting diseases like tuberculosis—VI.59); *Asiknī* or *Āsurī, Nīli* or *Nīlikā*, (*Indigofera tinctoria*; for curing leprosy—I. 23, 1-3; 24.2); *Avakā* (*Vallisneria spiralis*; for soothing effect and cure of burns—VIII.7.9; 37. 8-10); *Āla* (a weed of the cornfield: for curing eye diseases—VI.16.3); *Cipudru* (possibly a chip of *Palāśa* or *Butea frondosa* ; for the cure of abscess, neuralgia, pain in the heart and increasing blood circulation—VI.127.1-3; *Guggulu* (Bdellium; fragrant gum resin obtained from a plant: its incense is used for dispelling diseases.—XIX.38. 1-2); *Jaṅgīḍa* (*Terminalia arjuna*; specific against rheumatic troubles; external use in the form of an amulet; dispeller of diseases and demoniac influence—II.4.2; XIX 34.10; 34.1-5; 35.1); *Karīra* (*Capparis aphylla:* roots and stems used for the removal of worms-*Kauś.sū*. IV.29.20); *Kuṣṭha* or *viśvadhāvīrya* (*Saussurea lappa* : especially a good drug for curing fever and respiratory troubles—V.4; VI.10; XIX. 39); *Muñja* (a reed; *saccharum*, external application for the retention of urine;—I.2.3;) *Nitatnī* or *Kācamāci, (Solanum indicum*; regarded as the most efficacious for the growth of luxuriant hair—VI.136; VI.13); *Pippalī* (*Piper longum*; to cure all types of wounds caused by sharp weapons as well as *vātavyādhi* or nervous disorder;—VI. 109); *Prśniparṇī* or *Lakṣmaṇā* or *Putrakandā* (*Smithia conferta*; used for curing sterility or miscarriage in women; also for the alleviation of leprosy—II.25. 1-5); *Putudru (Acacia catechu* or *Pinus deodara:* expeller of diseases—VIII, 2.28); *Rajanī* or *Haridrā (Curcuma*

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longa : a remedy for leprosy; —I.23.1); *Rāmā* or *Bhṛngarāja*? (*Eclipta prostrata*; for curing leprosy; I.23.1) *Silāci*; syn: *arundhati* , *lākṣā* , *rohiṇī* (*Rubia cordifolia* used in setting fractures and curing wound;—IV.12. 1,2,5; VIII.7.6); *Taudi* or *Ghṛtācī* (not identified but is suggestive that the plant is aquatic; its root is anti-toxic;—X.4.24);*Tila* (sesame, *Sesamum indicum*; its ear/stalk or blossoms used as amulet for curing diseases—II.8.3); *Viṣāṇaka* (*Gymnema sylvestris*; a remedy for diarrhoea and diseases caused from wind;—III.7 1-2 ; VI. 44.3; IX 8.20); *varaṇa* (*Craeteva roxburghii*; a part of which is used as amulets ; also for curing particularly wasting disease, X. 3. 3 -5); *Vrīhi* : (rice : repels diseases, particularly wasting disease;—VIII.2.18); *Yava* (barley; noted for repelling bodily ailments;—VI.91.1).

DISEASES

Nurtured on the bed of religion and magic, supported by plants with medicinal as well as presumed magical values and guided by the knowledge of different deranged conditions of the human body, the Vedic concept of diseases is a queer blending of both rational and irrational phenomena. This state of Vedic medicine was also a common trait of ancient medicine in all the other regions where medicine first flourished in its own way—Babylonia, Egypt, and China. It may be emphasized that most of the ancient remedial measures consisted of sacrificial rites, incantations, charms, magic, amulets, talismans and the use of certain plants even as amulets.[62]

In the early period of the Vedic age, diseases were naturally conceived as a creation of the gods. For example, the Ṛgvedic people knew *yakṣma*, i.e. consumption or wasting disease which was believed to be due to the wrath of the gods.[63] However, the concepts about diseases began changing from the Atharvavedic period when some rational thinking about the origin of diseases also emerged. Even so, the rational ideas co-existed with the traditional ones in terms of god's wrath and seizure from supernatural elements as causes for the ailments. Supernatural elements were also considered as being causative of highly deleterious effects on the embryo and the child.[64] There was also the idea of the wonderful structure of man as mentioned in the *Atharvaveda,*[65] besides an imagery of altar construction vis-a-vis the construction of the cosmic world of the godhead, Prajāpati.[66] Attempts were also made to correlate the number of the different divisions of time in a year with the number of bones as well as the other parts of the human body. An analogy was also made between the formation of different linguistic metres and the human chest. The health and disease sections in the *Atharvaveda*[67] furnish a good account of the organs of the human body from which the diseases were sought to be wiped off by means of charms and spells or where a powerful amulet of the sage Kaśyapa was considered as the most efficacious for the cure of several ailments.

The *Atharvaveda* in different contexts has recorded the important organs which were later described by Ātreya (Caraka) and the Dhanvantari (Suśruta) schools. These are: heart (*hṛdaya*), lungs (*kloma*), gall-bladder (*malikṣṇa*); kidneys (*matsna*), liver (*yakṛt*), spleen (*plīhan*), stomach (*jaṭhara),* smaller intestine (*antras*), rectum and the portion above it the signoid (*guda*),large intestine (*vaniṣṭhu*), abdomen (*udara*),colon (*plāśi*),

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umbilicus (*nābhi*), marrow (*majjā*), veins (*snāyu*), arteries (*dhamanī*) and finer channels (*srāvas*). In addition, three circutatory organs are mentioned along with their respective functions as indicated by the charms specially for checking haemorrhage.[68] There were religious linkages too. Interestingly, the *Śatapatha Brāhmaṇa*[69] refers to all these organs as sacred to certain gods and sacrificial instruments. Apart from the aforesaid organs, five vital breaths are also alluded to in the *Taittirīya saṃhitā*.[70] One could read a linkage between the names of five vital breaths and the bricks used for sacrificial altar construction.

Anatomical structure from the heels to the cranium[71] and the number of bones in different parts of the body, as mentioned in some Vedic texts, seem to be a systematic account, although the Atharvavedic school of medicine differs in respect of the number of bones in some parts of the body from the Ātreya-Caraka school as well as from the Dhanvantari–Suśruta school, obviously because of the difference in the method of counting bones as we understand them today.[72] The development of each organ in the foetal stage was not unknown, for the growth of the foetus has been recorded in different texts of the Vedic literature, such as *Garbha upaniṣad*, perhaps a late Upaniṣad, but belonging to the Atharvavedic school.

Curative Practices

In the Vedic period, as noted before, diseases were regarded as abnormal conditions of the body and were termed 'evils' or 'sins'. They were sought to be repelled by adopting different measures, mostly religio-magical, suited to the nature of the disease, because the diseases were believed to have been caused by supernatural beings through their hostile powers which could be 'expelled' by magical acts and amulets.

The Vedic priests believed that the magic power of an amulet was produced by a substance residing in it.[73] The amulet materials were varied in nature and were prescribed in accordance with the nature of a disease or in harmony with the specific requirements of health. The plants included *aśvattha* (*Ficus religiosa*), *darbha* (*Poascynosuroides*), *khadira* (*Acacia catechu*), *aralu* (*Calosanthes indica*), *parṇa* (*Butea frondosa*), *varaṇa* (*Craeteva roxburghii*), sesamum, and barley.

The animal and mineral products generally included skins of antelope, bull or newly slain animal, horn of antelope, pearl and its shell, gold and lead, besides earth from an ant-hill, mud and salve. Some amulets were in the nature of a spear for curing colic and of a lute string for curing venereal disease. Even an amulet symbolizing a nautch girl was employed.[74] Spells, the power of words or *mantras,* was another type of esoteric remedy for several diseases. The *Atharvaveda* is full of spells for curing a wide variety of diseases.[75]

The treatment of diseases through amulets, spells and the like were always accompanied by one or the other type of ceremonial magic. If the disease was demon-based, its 'expulsion' was performed in two ways: propitiation and exorcism. Ceremonies of the latter included rubrication by several expelling hymns and drawing a ring of magic powder around the house to prevent the return of demons. There was also an interesting

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ceremony, which was intended to 'trap' the demons by an offering to fire surrounded by a ditch filled with hot water, after circumambulating the fire thrice with the chanting of a specific *mantra*. (*Kauś.Sū*. XXV.26; XXVIII.6.18; XXXI.3).

Transfer of a disease to another person was a common magically ceremonial practice with the concept of 'like towards like'. For example, jaundice was 'transferred' to birds of similar colour like the parrot, or fever to a frog by pouring water over the patient and putting a frog under his bed (*Kauś.Sū*. XXVI.18; XXXII.17).Bodily contact with certain substances was another magical way of curing diseases. Different methods were adopted for achieving success in this operation as laid down in the *Kauśika sūtra*.[76] These included: inhalation (wood of a desired plant or tree was put in fire and the smoke rising therefrom was inhaled to 'dispel' demons and worms (VII.28; XXV.23; XXVII.17.20); fumigation (breath of the magical performer as well as exposure to fumes) was considered efficacious (XXXI.19.20, XXV.9; XXXII.23); rubbing for 'driving' out sores and wrinkles (XXXI.9; XXV.5) and prescriptions or instructions for smearing or rubbing with certain plant substances over the whole body of the patient as ointment (XXV.4; XXVII.6; XXX.5). Interestingly, when 'driving off sores' was intended, the rubbing was performed with a magical plant or substance from the upper portion of the body downwards in order to drive the ailment into that part of the body which could have the least injury, and finally out of the feet. The *Kauśika sūtra* emphasizes that this rule, if reversed, would cause the destruction of worms. (XXIX.22)

There were two other ceremonial methods namely, *āplavana* (pouring) and *avasecana* (sprinkling). In the first case water which contained the leftover of the offering was used and in the second, water was merely blessed with an incantation of a hymn (XXVII. 28; XXVIII.8; XXIX.30) before sprinkling it over the body of the patient. Sometimes the two were combined (XXVI.41; XXVII.14) . The patient was also given water to drink after the priest had uttered the chosen *mantras* into it. (XXV.7, 11, 18; XXVI. 1, 12-14, 17; XXIX.22).

Empirical Ideas

Divine and demoniac origins as the causes of diseases apart, there are in the Vedic texts some anatomical, physiological and pathological views about the diseases which are neither magical nor religious. The derangement of the humours (*tridoṣa*), diseases due to seasonal changes, germs and worms, heredity, infection and the effects of unwholesome food, were also regarded as causes of disease. It should, however, be emphasized that the concept of *tridoṣa* or the humoral theory of the later Āyurveda as such did not develop in the Vedic period. The *Ṛgveda* contains the term, *tridhātu*, which may mean three basic elements of the body, viz., *vāta, pitta* and *kapha*, or may indicate *tejas* (fire), *ap* (water), and *anna* (food), according to Sāyaṇācārya.[77]

In the *Atharvaveda* , diseases are described as *abhraja* (born of cloud, i.e. phlegm), *vātaja* (born of *vāta* or *vāyu* i.e. wind) and *suṣmaja* (heat) i.e. bile. *Takman* (fever) in general was believed to be caused by fire. *Āsrāva* (disease relating to excessive discharge), insanity and *vātikāra* (a disease of the eye) were believed to have been caused by *vāyu*.[78]

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The occurrence of diseases as a result of seasonal changes[79] was well-known in Vedic times; likewise, diseases caused by germs and worms. There was, as noted already, also the concept of hereditary disease, called *Kṣetriya* or the one related to *kṣetra* which could be passed on from one generation to another. In such cases the new born baby had to undergo some propitiatory rites so that he or she might not be a victim of hereditary disease. In the *Atharvaveda* certain medicinal herbs have been invoked for warding off a disease inherited from the parent.[80] Apart from these aspects, the *Atharvaveda* recognized that contaminated food could also cause diseases.[81] Nearly one hundred diseases of different types have been named in the entire Vedic literature, as being of two types; (i) principal and (ii) secondary or the accompanying ones. Among the former is fever, considered by the Vedic people as the most disturbing health hazard, specially in the north-western and eastern parts of India. The other diseases comprise *balāsa*, boils, consumption, discharges from the body, dropsy, head disease, insanity, jaundice, some hereditary diseases, leprosy, paralysis, rheumatism, urinary problems, etc. It is relevant to note that the Vedic people regarded some of the principal diseases, like fever, boils and paralysis, as those accompanying or arising from acute pain, anaemia, asthma, cough, epilepsy, erysipelas, eye-problems, thirst, and various skin afflictions.

Gods and Diseases

In the magico-religious medicine of the Vedic people gods were presumed to be in two moods—anger and calm, to cause disease or to repel it respectively. Both the moods were supposed to be displayed by one and the same god depending upon the situation. Varuṇa earned a pre-eminent position as a dual-natured god causing sufferings in the form of disease as punishment to those who committed a sin, or curing the ailment if propitiated. However, Rudra was believed to cause diseases by his spears and arrows. In their healing activities, gods or goddesses were regarded as being of four types, viz. remedy-god, healing-god, one proficient in recognizing curative properties of medicinal plants, and goddess associated exclusively with procreation and childbirth.[82] However, most of the god-physicians had some common medical attributes, like their capacity for the prolongation of life, childbirth and childcare.

Agni[83] has been extolled as a physician as well as a maker of remedy 'Thou art a physician (*bhiṣaj*), and maker of *bheṣaja* ; by thee may we gain cow, horse, and men' (AV.V.28.1). He was also regarded as a reliever from insanity, fever, snake bite and other poisons, besides his capability for virilization and prevention of ageing'.

Sūrya[84] **Savitā** or **Āditya** was considered to be capable of curing heart and eye diseases, jaundice, poisoning and even any chronic disease, if one worshipped the sun.

Indra[85] was recognized as the god of medicine and health whose healing skill was particularly noted for the bestowal of long life, vigour and procreative power; prevention of death of the embryo and infant; cure of baldness, consumption; surgical skill in the suturing of a torn part of the neck before the blood oozed out and the like. It should be noted in this connection that the Ayurvedic classic, the *Caraka Saṃhitā* states that Indra learnt the science of medicine from Aśvins and then taught it to Ātreya and Bharadvāja.[86]

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Varuṇa[87] the god associated with water, with his dual nature of inflicting disease as well as dispelling the same, was supposed to know innumerable medicines for the cure of water-caused diseases. He was also regarded as the bestower of immortality.

This concept of Varuṇa did not wane in the Ayurvedic period, when some metallic preparations like *Varuṇādya ghṛta* for the cure of urinary trouble were ascribed to Varuṇa as in the Vedic texts.[88]

Rudra[89]**(Paśupati or Bhava)** was hailed as an eminent physician or a god of remedy and the lord of medicine; He was credited with the skill to cure colic or colicky pain (*śūla*), excessive discharges from the body, fever and scrofulous sores. The Vedic tradition of Rudra as a god of remedy continued for a long time and even now that idea has persisted. Worship of Rudra by propitiatory rites was performed, then as now, as preventive as well as curative methods for combating diseases like tuberculosis, diabetes, fever, poisons, and other conditions.

Vāyu or ***Vāta***[90] was naturally associated with vital breath and pure air as well as some medicinal properties for taking away all sorts of defilements.

Maruts[91], the rain or storm gods were supposed to bring medicinal plants from their places of origin and were also invoked for the exuberant growth of medicinal plants. A ceremony used to be performed for the propitiation of Maruts for curing leprosy.

Aśvinī-kumāras[92], the venerated divine physicians, were, unlike Rudra, regarded as being beneficent. Their medical achievements included their methods of rejuvenation and revival of the dead or prolongation of life; cure of blindness and deafness; cure of wounds and surgical treatment. The *Brahma Vaivarta Purāṇa,* refers to certain treatments by Aśvins under the *Cikitsāsāra tantra* . The *Bower Manuscript* in its eleventh chapter deals with the principles and practice involving chebulic myrobalan according to Aśvins. There are also other texts like *Aśvina Saṃhitā*, which throw light on the continuous tradition of Aśvins in later times.

Materia Medica[93]

Vedic materia medica was sufficiently extensive in which herbs had a prominent place in the context of their presumed pacificatory or even non-pacificatory or harmful qualities. Next in importance to plants were the products of the cow which were used either for their own efficacy or as a suitable vehicle for other remedies: butter (*ājya* or *sarpis*), curds (*dadhi*), milk and buttermilk, were used both for external and internal use. The other substances included water from different sources, varieties of earth, powdered shells, and rock-salt. As for the particular variety of earth, Bolling[94] remarks that the earthy material from an ant-hill contains formic acid which is beneficial as a cathartic. In almost all cases, excepting poison-cure, a lump of ordinary earth is referred to as an auxiliary substance, while the earth from a mole-hill (*ākhukarīṣa*) is stated to be effective against constipation. (*Kau.Sū.* XXV.1, 4; XXVI.1, 8, 13, 17, 29-33; XXVIII.6; XXXI. 23).

Methods of administration : The intended medicinal preparations were in a way spiritualized before their administration along with the leftovers of offerings to the gods. Medicines were administered through either a cornucopia or a suitably shaped cow's

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horn, a red copper vessel, a small yoke or a pestle. Whenever necessary the preparation of a medicine was accomplished in a container by heating it over burning reeds. Generally food of any type was served which would be in the nature of a vehicle for the administration of medicine (*Kau.Sū.* XXVIII. 12,15). Porridges specially of rice, were frequently used as an adjuvant. Sometimes honey and fat were also prescribed. Mothers' breast–milk was also recommended as a vehicle of medicine for an infant, but generally after the infant had completed one year of age. (*Kau.Sū.* XXVI. 1, 18-19; XXVII.10, 31-32; XXVIII.28; XXX. 1).

As noted before, amulets also formed a separate mechanism for the administration of medicine. In this practice, a patient was advised to drink a medicated solution in which the amulet which was made from the required substance was steeped for three days. There were specific places and times too for the treatment of diseases. Normally, the selected places were the confluence of two streams for curing dropsy, and cross-roads and ditches for general diseases. The suitable time for taking a medicine was sunrise, noon, sunset or when the stars would fade away. (*AV*.III.7.7; *Kau.Sū.* XXVII. 21-25).

In general, the conceptual approach of Vedic medicine was that since religion also aims at the welfare of man and even beyond his physical body, certain rituals and the propitiation of gods would be effective for obtaining relief from ailments of a diverse nature. This tradition, in one form or the other, continued in the post-Vedic times and even later—a healing tradition which is not deprived of its hold on the people even today.

Appendix I

IMPORTANT DISEASES AND THEIR REMEDIES

Apacit (glandular boils, sores, scrofulous swelling, tumours of the neck and the like)
Remedy: (i) surgical operation using either the root of *Devamuni* (*Saccharum arundenacum*) or an arrow made of *Veṇudarbha* (perhaps bamboo stalk); (ii) use of boiled vegetable product, pulverized shell or powdered rock-salt for external application only; (iii) suction of impure blood from sores by applying leeches. (*AV*.VI. 25 1–3; 83.1–3; VII.74; 76.2; *Kauś Sū,* IV.30.14-17)

Āsrāva (diarrhoea, dysentery, or morbid outflow)
Remedy: i). Use of a decoction of the plant *Viṣāṇaka* (*Gymnema sylvestris*); (ii); tying of a Muñja reed on the body of the patient; (iii) Anointing the patient's body with clarified butter. (*RV*.VIII.48.4-5; *AV*.I.24; II. 3.2–5 VI.44-2)

Balāsa (wasting disease / phlegmatic disease)
Remedy: i) use of Soma plant extract; bulrush of one year old; chips of *Palāśa* (*Butea frondosa*) wood as amulet; exposure to sunrays. (AV.1V.9.8. V.22.11-12;IX.8.8,10; XIX.34.10, VIII.7.10; 2.18; VI.14. 127)

***Eye-diseases* of different types.**
Remedy (i) leaves and seeds of mustard as well as some creepers for internal as well as external use; use of the prescribed amulet (*AV*.VI.16; V. 4.10; *AV*.P. VII.5.4.; 15. 6-7)

Grāhi (seizure/fits/epilepsy)
Remedy :(i) a charm known as Brahma; (ii) amulets of *daśavṛkṣa* (woods of ten plants or a plant called *daśavṛkṣa*) of *Sadaṃpuṣpa* (*Calotropis gigantea*);(iii) gruel of powdered

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Śamī (*Prosopis specigera*) leaves or its fruit or powdered grains; and (iv) symbolic loosening of fetters of sin in the form of *Muñja* grass. (*RV*.X.161.1; 103,12; *AV*.II.9.1; III.2.5; VI.112; VI.113.1; *Kau. Sū*. V.46.26-29).

Harimān, Harita (jaundice)
Remedy (i) drinking Soma juice mixed with milk or a drink of milk and porridge of turmeric; (ii) exposure to sunrays; (iii) use of an amulet of Añjana (a particular collyrium-like substance available on Mount Trikakud and river Yamunā); and (iv) magical treatment, both sympathetic and symbolic: by 'sympathetic' treatment the disease is sought to be transferred to yellow coloured *śuka, haridrāva* and *ropaṇaka,* indicating either three birds or three plants; by 'symbolic' magic, the patient is sought to be associated with red bull for redness of skin. (*AV*.i.50.11–12; 1.22. 1-2, 4; IX.8.9.;IV 9.3; *Kau.Sū*.IV.26.14-15)

Head diseases (ailments)
Remedies: (i) use of plant *Kuṣṭha* in combination with butter for anointment (*Kau. Sū*. IV.28);
(ii) for headache, exposure to sunrays, putting clarified butter (ghee) into the nose or taking a drink prepared from the fat of some animal ghee and sesame oil ; (*AV*.I.12.1; IX. 8.2; *Kau.Sū*. IV.26.1-9); and (iii) for any general head ailment which would manifest itself in the form of earache, neuralgia, deafness, blindness, etc., exposure to sunrays. (*AV*. IX.8.1.5)

Heart disease
Remedy: exposure to sunrays and drinking river water (*RV*.I.50.11-12; *AV*.I.22.1-3, 4; VI.24.1-3; *Kau.Sū*. IV.26.15-17).

Jalodara (dropsy)
Remedy:(i) treatment with different types of water and (ii) application of ointment made of the powder of *Palāśa* (*Butea frondosa*) wood. (*AV*.i.10; VI.24; VI.127; *Kau. Sū*, IV.25.37; V.30.13; V.29.39; V.32.14-15).

Jāyānya (venereal disease)
Remedy : use of an amulet made of añjana, and ***Viriṇa*** (*Andropogan muricatus*), (*AV*.VII.76.3.5; 80.3; VIII.80.4; 14.2; T.S.II.3.5.2; *Kau. Sū*. IV.32.11-13.

Kilāsa (leprosy)
Remedy ;(i)exposure to sunrays; (ii) application of a paste made from night-born plants, namely. *asiknī, āsurī, rāmā, rajanī, pṛśṇiparṇi*; and (iii) use of cow-dung paste as an ointment.(*AV*.i.23; i.24;ii.25,2,3.5; *AV*. P.IX.3.9-13; IX.25.3; XXIII.16.10; *Kau Sū*, IV.26.22-24).

Kṣetriya -(hereditary diseases or organic incurable diseases)
Remedy: (i) use often of amulets made of i) *Apāmārga*, or straw of the brown or whitish barley and sesame stalk: and (ii) antelope-horn, invocation of the two stars (not identifiable). (AV ii-8;10, etc.)

Poisoning (by the bites of serpents, scorpions and insects)
Remedy : (i) Charms and spells: (ii) drinking *Soma* juice; (iii) drinking extracts of liquorice (*Brassica latifolia*); (iv) taking sub-soil water dug by ants, and (v) water from certain rivers. (*AV* IV.6; 7; V.13; VI.100; VII.56).

Takman, jvara (fever):
Remedy: (i) use of decoction of plants, like *Kuṣṭha* and *Jaṅgīḍa* as well as Añjana; (ii) sponging with hot water; and (iii) drink made of gruel from roasted grains; application

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of symbolic magic consisting of tying a frog having reed like stripes, on the armpit of a patient by the priest.(*AV*.i.25; 2-3;V.22.; VI.20; VII.116.2. IV.8.6; V.4.1; IV.9.8; XIX.39.6,8,10; *Kau.Sū*. IV.26.25;IV.32.17).

Worms: As for the worms (*kṛmi*) there are hymns in the Atharvaveda (II.31, and 32; V.23) which give details about them—their physical characteristics, places of their generation in different parts of the body and the damage caused by them to the body. Remedy: exposure to sunrays, use of prescribed charms and spells and the incantation of Agastya .

Yakṣma (consumption or general decline of health)
Remedy: (i) exposure to sunrays and air, (ii) drinking an essence prepared from rice, barley and rain-water; or water diluted with clarified butter and ambrosia; (iii) use of amulets of certain plants; and (iv) inhaling incense of *guggulu* i.e., bdellium (*RV*.X.161; *AV*.ii.33. 1–7; xx.96,17-23; IX.8.13–19; III.31, 8–11; VI.85.1, 2; III.12.9; V.4.10; XIX.36.3;IV.13.2).

APPENDIX II

Some Important Vedic Passages

Bṛhaspati the progenitor of the entire vegetable kingdom
Yāh phalinīryā aphalā apuṣpā Yāśca puṣpiṇih / Bṛhaspatiprasūtāstā no muñcantvaṃhasaḥ // (RV.X.97.15)

"Those that bear fruits and those that are without fruit,
those that have flowers and those that are flowerless—all these
herbs propagated by Bṛhaspati protect us from sins (i.e.diseases)".

Yā oṣadhīḥ somarājñīrviṣṭhitāḥ pṛthivīmanu / Bṛhaspatiprasūta asyai sam datta vīryaṃ // (Rv. X.97.19)
"May the herbs, whose king is Soma, who are spreading in different places of
the earth all those propagated by Bṛhaspati, bestow strength to this ailing man".

Definition of physician
Yatrauṣadhīḥ samagmata rājānaḥ samitāviva/ Viprāḥ sa ucyate bhiṣagrakṣohāmivācātanaḥ (RV.X.97.6)

"As the kings assemble (in battle), so the herbs come together to a person who
knows the (healing virtues of) herbs. That wise is called physician who
destroys the Rakaṣasas and diseases".

Major divisions of plants
Atharvaṇīraṅgīrasīrdaivīrmanuṣyajā uta /Oṣadhayaḥ pra jāyante Yadā tvaṃ prāṇā jinvasi // (*AV*.Xi.4.16)

"The holy (atharvana) Plants, the magic (Aṅgīrasa) Plants, the divine Plants,and
those produced by men,spring forth,when thou,
O prāṇa, quickenst them". (Bloomfield)

Division of Plants with curative properties
Agnerghāso apāṃ garbho yā rohanti punarnavā/ Dhruvāḥ sahasranāmnī-ṛbhesajīḥ santvābhṛtīḥ // (*AV*.Viii.7.8)

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"They that are the food of Agni (fire), the offspring of the waters, that grow ever renewing themselves, the firm (plants) that bear a thousand names, the healing (plants), shall be brought here". (Bloomfield)

Efficacy and power of an amulet

Vaiyāghro maṇirvīrudhāṃ trāyamāṇobhiśastipāḥ/

Amīvāḥ sarvā rakṣāṃsyapa hantvadhi dūramasmāt //

(*AV*.VIII.7.14)

"Tiger- like is the amulet (made of) herbs, a saviour, a protector against hostile schemes: may it drive off far away from us all diseases and Rakaṣas". (Bloomfield)

Kaśyapa's charm against diseases

Aṅge-aṅge lomni-lomni yaste parvaṇi-parvaṇi / Yakṣmaṃ tvacasya te vayaṃ kaśyapasya vīvarheṇa viṣvañcam vi vṛhāmasi // (*AV*.ii. 33.7)

" The disease that is in thy every limb, thy every hair, thy every joint; that which is seated in thy skin, with Kaśyapa's charm, that tears out, to either side we do tear it out" (Bloomfield)

Magnanimity of Kuṣtha plant, healer of fever

Sa kuṣṭho viśvabheṣajah / sākaṃ somena tiṣṭhati / Takmānaṃ sarvaṃ nāśaya sarvāśca yātudhānyaḥ // (AV.XIX.39.5)

"This Kuṣṭha, a universal remedy, stands together with *soma*. Destroy thou every *takman,* and all female demons". (Bloomfield)

Tridoṣa or humoral theory

Yo abhrajā vātajā yaśca śuṣmaḥ" / (AV.I.12.3)

"(Diseases) those which are produced by rain (water) those by wind and those by fire".

Water possessing healing virtues

"Āpah pṛṇīta bheṣajam varūtham tanve mama /Jyok ca sūryam dṛśe //

Śam no āpo dhanvanyāḥ śamu santvanūpyāḥ/ Śaṃ naḥ khanitrimā āpaḥ

Śamu yāḥ kumbha ābhṛtāh śivā naḥ santu vārṣikīḥ // (*AV*.I.6.3-4)

"O waters, bestow a remedy, protection for my body, and long to see the sun. Weal for us the waters of the plains, and weal be those of the marshes, weal for us the waters won by digging, and weal what are brought in a vessel; propitious to us be those of the rain". (Whitney)

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CHAPTER 2

Foundational Ideas of Ayurveda

B.G. Gopinath

Ayurveda is defined as a the holistic knowledge of the harmony of the body, senses, psyche (*sattva*) and soul (spirit). The main objectives of this ancient Indian medical science are the maintenance of health and the eradication of illness, thus enabling a person to lead a healthy long life, the ultimate object of which is to achieve the four purposeful dimensions of life (*dharma, artha, kāma* and *mokṣa; puruṣāratha catuṣṭyaya*) in tune with the general Indian religio-philosophical ethos. In particular, salvation (*mokṣa*) from the cycle of birth and re-birth is the ultimate goal of human life as envisaged in the orthodox systems of Indian philosophy. Adherence to *dharma*, earning a livelihood or gaining wealth and fulfilling the worldly desires should not be incompatible with one another. But it is very essential to have a healthy and long life to achieve the above goal. Diseases reduce the span of life, cause misery and hinder both physical and mental activities. Therefore, a science dealing with the varied aspects of robust health or ill-health, and the preventive as well as curative measures, to ensure good health was found necessary and this resulted in the origin of Ayurveda, a codified medical system.

It may be noted that Ayurveda does not merely limit itself to a few diseases or drugs of medicinal value. It would not have survived from its origin to the present with the same vigour, had it not been anchored on a bedrock of unassailable foundational thoughts, fully sustained by philosophical propositions of its contemporary period. The study of Ayurveda was tantamount to a study of medical philosophy that drew sustenance from the philosophies then prevailing in India. The contents of ancient Ayurvedic literature, like the original *Agnivésa saṃhitā*, (later redacted by Caraka and now known as the *Caraka saṃhitā)*, and the *Suśruta saṃhitā* bear ample testimony to this view. Surprisingly, these two treatises depict philosophical thoughts in such a manner as not to allow the reader to feel that they are borrowed from other sources. The two *saṃhitās* make no reference to any particular philosophy barring *Ādya Sāṅkhya* and *Yoga* at a few places in these texts.

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Philosophical views of all hues were no doubt prevalent even before Ayurvedic knowledge came to be codified scientifically in the form of classical texts. Probably they were not yet codified and classified as *Ṣaḍdarśanas* (six systems) as we know them today. The term *Ādya Sāṅkhya, (nirīśvara)* referred to in the *Caraka saṃhitā* appears to stand for a wide range of philosophical thoughts of various systems which came to be classified perhaps later than the Ayurvedic systematisation. Probably no separate codified text of philosophy was available during the time of Agniveśa. Besides, the religio-philosophical ideas were concerned more with spirituality than the healthy material life. Hence, it became necessary for the propounders of Ayurveda to describe the relevant thoughts in their texts which were equally useful for understanding the dimensions of material life. It should, nevertheless, be emphasised that both spirituality and materialism have their role to play, each complementing the other, within the framework of Ayurveda.

CARAKA SAṂHĪTĀ

The philosophy in Ayurveda forms a viable foundation for understanding as well as explaining almost all the concepts and theories related to Ayurveda. Philosophy as described in Ayurvedic literature is, therefore, an applied philosophy, in the confines of medical science. It is pertinent and quite interesting too, to examine the core ideas of Ayurveda in this background, taking suitable examples specially from the *Caraka saṃhitā*(*CS*), which is considered to be the most authentic Ayurvedic compendium. Originally named *Agniveśa tantra*, it was composed by the sage Agniveśa, the most brilliant disciple of Ātreya Punarvasu—a great preceptor who had learnt Ayurveda from Bhāradvāja, the sage physician. Tradition claims that the sage Bhāradvāja was deputed to Indra by many eminent sages who had assembled at the foothills of the Himalaya mountains to discuss the impediments to health and longevity, which in turn hindered not only daily routines and rituals but were also obstacles to achieve the four-fold objects of life eventually leading to salvation. The origin of Ayurveda is traced to Brahma, the Creator, who was supposed to have imparted the medical knowledge to Prajāpati who, in turn, taught it to Aśvins from whom Indra received it.

Ātreya Punarvasu had six disciples among whom Agniveśa was acknowledged as the most brilliant. However, his treatise, the *Agniveśa saṃhitā* or *tantra* was found to be wanting at some later point of time, in some chapters at the end of the text. After some time, the missing chapters were made good by a devoted scholar by name Caraka. Further, the whole text was later revised and redacted by yet another scholar-physician called Drḍhabala. The *Agniveśa tantra* thus underwent some modifications leading to the *Caraka saṃhitā* which has come down to us consisting of 120 chapters extending through 8 *sthānas* as follows:

	Sthāna	*Number of chapters*
(i)	*Sūtra* (Principles)	30
(ii)	*Nidāna* (etiology, symptomatology and pathology of a few diseases)	8

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(iii)	*Vimāna* (specific measures of standardisation, quantification and its application	8
(iv)	*Śarīra* (Human body)	8
(v)	*Indriya* (signs of ensuing death)	12
(vi)	*Cikitsā* (therapeutics) (from 13th to 30th chapters rewritten by Dṛḍhabala)	30
(vii)	*Kalpa* (rewritten by Dṛḍhabala; specific formulations)	12
(viii)	*Siddhi* (procedures of treatment)	12

Agniveśa, who, as noted before, was a disciple of the sage Punarvasu Ātreya, is believed to have lived around the sixth—fifth century. B.C. Caraka, the redactor, is believed to have lived in the 2nd century B.C. or A.D. and Dṛḍhabala, the second redactor, in the seventh century. Almost all the philosophical discussions concerning Ayurveda, except those that are specific to *Kāyacikitsā* are found in the *Sūtra, Vimāna* and *Śārīra sthānas* of CS only. The chapters I, VIII, XI, XXV and XXX of the *Sūtra sthāna*; III, IV and VIII of *Vimāna;* I, II, III and V of *Śarīra sthāna* are replete with philosophical discussions which encompass in a discrete manner the themes of the religio-philosophies called the *Sānkhya*, *Nyāya, Vaiśeṣika, Yoga, Vedānta* and *Mīmāṃsā* without referring to their names as such in the same way as they are known to us today. Even in the *Suśruta saṃhitā* these names are conspicuous by their absence, though this classified text expounds their thoughts here and there wherever the context warrants. These facts lead to a possible question as to whether the Ayurvedic texts came into existence much earlier than the period in which these philosophical systems became distinctive.

The contents (*sthāna*-wise) of the CS in brief are:

(i) *Sūtra*: (a) Drugs useful for maintaining health and curing diseases; (b)methods and measures to maintain health and prevent diseases; (c) some fundamentals in brief; (d) some measures of treatment; (e) some diseases and their management; and others

(ii) *Nidāna*: Classification and diagnostic aspects of eight diseases.

(iii) *Vimāna*: Dietetic rules; concept of epidemic diseases; methods of examination of a patient: types and procedure of professional debate;

(iv) *Śarīra*: Philosophy of the creation of universe, concepts of pain and misery and their solution, foetal life; anatomy-physiology; pre-and post-natal care of women and child care.

(v) *Indriya*: Features and characters related to a person or any peculiar change in the behavioral pattern of a person or his relatives; environmental conditions of a person; omens considered as bad-all leading to the prediction of death;

(vi) *Cikitsā*: First two chapters deal with *Rasāyana* (rejuvenation) and *Vājīkaraṇa* (virilization) respectively; the rest of the chapter deals with diagnostic and management aspects of many major and minor disorders, including disorders of women; this section is regarded as one of the best in comparison to all the therapeutic descriptions given in the other similar texts.

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(vii) *Kalpa*: Description of various drugs and their therapeutic preparations used for the five major eliminatory processes (*pañcakarma*); and

(viii) *Siddhi*: description of the plan of action of each major eliminatory process and their benefits; concluded with a description of *Tantra yukti*—similar to the *Suśruta saṃhitā* and *Aṣṭāngahṛdaya*.

SUŚRUTA SAṂHITĀ

This is one of the three great Ayurvedic classics and was composed by Suśruta, an ardent disciple of Dhanvantari. While the *Caraka saṃhitā* lays emphasis on therapeutics, the *Suśruta* saṃhitā is well known for its surgical descriptions and hence it is considered *śalya pradhāna-tantra* (surgically oriented). It belongs to Dhanvantari tradition, while the *Caraka saṃhitā* belongs to the Ātreya (medical) tradition. The *Suśruta saṃhitā* contains descriptions, discussions, theories, and postulates pertaining to all the eight branches of Ayurveda; but the surgical descriptions are predominant. As compared to the *Caraka saṃhitā*, the philosophical and foundational ideas of Ayurveda are rather meagre in *Suśruta saṃhitā*. Nevertheless, this text does not totally preclude philosophical dispositions, even though the essence of *Nyāya, Vaiśeṣika* or Yoga and Vedānta do not find their place to the extent they are in the *Caraka saṃhitā*.

The *Suśruta saṃhitā* consists of the following *sthānas* :

(i) *Sūtra* : Fundamental principles of surgery and surgical instruments; other aspects including food articles;

(ii) *Nidāna* : Major disorders where surgical or parasurgical interventions are found necessary;

(iii) *Śarīra* : Postulates on the origin of the universe, embryology, anatomy, physiology, mother and child care.

(iv) *Cikitsā* : Management of several specific diseases and general therapeutic measures of *Kāya cikitsā* also;

(v) *Kalpa* : Poisons (animate, inanimate and artificial) and their management;

(vi) *Uttara tantra* : Opthalmology, ear, nose and head, and spiritual cure; (originality and authenticity of this *sthāna* as presently available in the text is, however, debatable).

PHILOSOPHICAL ASPECTS

It is not difficult to answer a natural query as to why Ayurveda, being chiefly a medical science, has amalgamated several philosophical aspects with medicine leading to an impression that philosophy indeed forms as much an important and integral part of Ayurveda as health and longevity do (see appendix II).

An insight into the circumstances under which the early treatises came into being provide an answer to this question. An Ayurvedic physician was known as a Vaidya—derived from *'vidalṛ'jñāne*—meaning a person of profound knowledge. Ancient tradition demanded that a physician should be truly a friend, philosopher and guide, both in the

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spiritual and material life of a sick person who would approach him for curing his disease. An Ayurvedic physician was, therefore, expected to possess a thorough knowledge of various aspects of both spiritual and material life. Although the spiritual (self emancipation) was its sublime and ultimate goal, Ayurveda held that this would not be possible without a healthy, wholesome and contented material life, for the latter forms an essential stepping stone for the former. Hence an optimum balance or harmony between spiritual and material life was considered imperative. The *ācāryas* (preceptors), therefore, believed that Ayurveda serves as the coalescence between spiritual life on the one hand and the material life on the other. It also became necessary to determine the objects of knowledge and the rational ways and means to know them as well as the methods of expressing such knowledge while interacting with erudite people or communicating with the common man. It was realized that a physician should not remain totally isolated in a world of drugs and books, if he really wished to attain the fruits of his knowledge. This needed the ability to educate the people about health and health problems which, in turn, required a wise communicative skill that could only be mastered by involving oneself in an exclusive study of the materials and their attributes, space, time, mind, and self, participating in professional discussions or debates, and mastering the art of elocution apart from a physician's proficiency in the diagnosis and treatment as well as practical training.

All of these were mandatory for a qualified Ayurvedic physician. Only such physicians were considered able and eligible to treat the royal families as well as the common people. A physician devoid of such profundity was forbidden to practise Ayurveda and was even subjected to ridicule. The philosophical foundation of Ayurveda was, therefore, as much a professional necessity as its socio-cultural compulsions.

Under the circumstances mentioned above and in order to maintain a high professional standard, the early codification of Ayurveda commenced in an ambience where philosophy was the main disposition of the times.

The importance attached to consummate knowledge can be perceived by the following statements made by Caraka in different contexts: (All references given in brackets are to the *Caraka saṃhitā*; its *Vimāna* and *Sūtra* sthānas).

(i) There is no limit to Ayurvedic knowledge. Therefore one should always try to get more and more knowledge without any prejudice. The entire universe is the teacher to an intelligent person, but an enemy to an unintelligent one (*Vi*. VIII. 14)

(ii) The wise will never err in adopting a proper line of treatment, for they start treatment only after gaining a thorough knowledge by examining from all the angles (*Vi*. VII.7).

(iii) A knowledgeable person will examine (*Vi*. IV. 9) everything from all aspects and thus understand the truth first and then proceed to act (*Vi*. 4. 9-10).

(iv) One who does not enter into the internal environment of a patient with the bright lamp of knowledge cannot cure the disease (*Vi*.IV. 12).

(v) The entire realm of sorrow emanates from ignorance while happiness and blissfulness come from serene wisdom (*Sū*. XXX. 84)

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(vi) This Ayurveda śāstra with its wide scope is not illuminating to the ignorant ones, as the Sun to the blind. (*Sū*.XXX. 85).

(vii) All activities of human beings are actually directed to experience happiness. But knowledge and ignorance respectively lead some to tread a right path or a wrong path. But a knowledgeable person, after a thorough appraisal, takes recourse only to good actions leading to happiness, while the ignorant, full of *rajas* and *tamas* qualities, act according to their pleasure which may not be wholesome and may eventually lead them to sorrow and misery (*Sū*.XXVIII 36-38).

(viii) Ayurvedic *ācāryas* were indeed against quackery (*Sū*.XXX.83) and therefore did not hesitate to condemn it in harsh terms as can be seen in the following statements.

(a) Such persons in the guise of physicians cheat the patients. They are devoid of knowledge and experience of Ayurveda and the truly qualified should keep off from such persons who are the followers of Yama (Lord of Death) and are like poisonous snakes (*Sū*.XXX).

(b) An investigator or experimentalist (*parīkṣaka*) will be an abode of intellect, classical knowledge, memory, firmness, wholesome acts, good speech, peace and boldness, while these are not found in quacks (*Sū*.XXVIII.38-39).

(ix) Practical experience is the mode of getting rid of ambiguity, and logical discussion is the best means for obtaining knowledge. Inability is the worst and causes fear. Discussion among scholars of respective sciences is the best augmentation of intellect. (*Sū*.XXV. 4).

(x) A physician should examine the disease at the outset and then the medicaments. The treatment should be commenced only thereafter with perfect knowledge of both.

(xi) Even a physician who starts treatment without prior knowledge of disease but with some knowledge of medicaments may succeed occasionally and that occasional success will be purely out of chance alone.

(xii) But a physician having perfect knowledge of disease and all medicaments with respect to *deśa* and *kāla* (region and time) and dosage (posology) will have sure success.

(xiii) Knowledge of mere names and forms of a drug is insufficient to understand the principles governing the correct application of drugs.

(xiv) A drug not understood properly is likened to poison, weapon, fire and thunderbolt, while the one properly understood is like nectar.

(xv) Even a poison can become an excellent medicine if it is properly used and, if not properly used, it may prove fatal.

(xvi) The wise person who aspires to be a physician should make special efforts to maintain his good qualities so that he can be the life-giver to human beings.

Suśruta has also stressed the importance of thorough knowledge as well as experience for practising medicine. He states: 'A person who knows only theoretical concepts devoid

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of practical training or *vice versa* will faint no sooner he comes across a true patient, will not be respected by scholars and deserves to be punished by the King' (*Su.sūtra*. III.48-50)

He states further : 'A person, devoid of knowledge, is comparable to an ass carrying a heavy load of sandal without knowing its fragrance and value; for, the ass knows only the weight of the load and not its value' (Su.Sū.III.56).

'The disciple after the completion of his formal study of medical subjects is advised to spare no efforts in gaining expertise in classical knowledge, power of proper expression, understanding the real meaning of the terms and communicative skills.'

The foregoing quotations amply demonstrate that Ayurvedic preceptors strongly believed in total knowledge as well as practical experience with a high standard of proficiency in both, in order to save the life of a patient. Thus they were respected by the society, and honoured by kings. This aspiration for a high academic standard by itself led the ancient sages to think of inculcating in a medical student the then prevalent means of gaining knowledge of both spiritual and material aspects of Ayurveda.

Both Caraka and Suśruta have given a methodical exposition of various concepts and have emphasized the need as well as the rational means of understanding them. Among these are:

(i) *Kāraṇa* (the cause of action); (ii) *Karaṇa* (the instrument which helps an agent to perform an action); (iii) *Kārya yoni* (one which becomes an action by the process of transformation); (iv) *Kārya* (one whose accomplishment is kept in view before an agent proceeds to act); (v) *Kāryaphala* (the object for which the action is initiated); (vi) *Anubandha* (the effect of good or bad which is bound to have an impact on the agent after the performance of his action); (vii) *Deśa* (the location or site favourable or otherwise for an action); (viii) *Kāla* (the process of transformation into seasons, etc); (ix) *Pravṛtti* (initiation of action as a means for the accomplishment of an object or beginning of an action); and (x) *Upāya* (means of bringing about excellence in the agency).

At this stage, it is desirable, indeed necessary, to have some insight into the standpoints of the Nyāya, Vaiśeṣika and Sāṅkhya systems of philosophy. This would be of value to the proper understanding of the position of Ayurveda in relation to these systems (See Appendices).

Nyāya Philosophy and Ayurveda

A brief description of the Nyāya philosophy is given in the Appendix. There is no mention of *Nyāyadarśana* in the ancient Ayurveda literature, though the core of Nyāya philosophy has been extensively made use of wherever necessary. For example: the diagnosis of a disease becomes possible by knowing the etiology (*hetu*), symptomatology (*lakṣhaṇa*) pathological changes (*samprāpti*), differential diagnosis (*vyavacchedakanidāna*), prognostic studies (*sādhyāsādhyatā*), complications (*upadrava*), signs of ensuing death, stages of disease (*vyādhyāvasthā*), the chief site of disease (*adhiṣṭhāna*) and the system affected (*srotas*) etc.

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According to Ayurveda, health is a state of equilibrium of *tridoṣas* in brief, but the *tridoṣas*, *sapta dhātus*, and *malas* should be engaged in their normal physiological functions. The mind, sense organs and the self (*ātmā*) should be calm, quiet and pleasant.

Ayurveda recognizes that the strength of a disease relative to the incumbent patient is important to determine the dosage, the measures of treatment and to decide on the prognosis of a disease. The strength of a patient means his resistance power or tolerance threshold and also the extent of his immunity to disease. Such strength can be adjudged by examining a patient for his constitution, capacity for exercise, digestive power, the quality of food consumed, mental make-up or behaviour (*sātmya)*, age, compactness of the body, proportionate measurement of different parts of the body, and the like.

It has been stressed that drugs that are used for treatment, either fresh green herbs or compound drugs, should be qualitatively good, effective, unharmful, clean and pleasantly palatable. The herbs have to be examined in detail with respect to their place of origin (habitat), and their medically efficacious ingredients.

It is important to note that Ayurveda emphasises in unmistakable terms the importance of detailed examination as noted above. For this purpose, Ayurveda needed some scientific devices or methods of approach. This necessity must have prompted the Ayurvedic preceptors to adopt the means of obtaining valid knowledge like direct perception, inference and what is called *āptopadeśa* (*pratyakṣādi pramāṇas*) that the Nyāya philosophy has expounded. But in Ayurveda they are rightly called *parīkṣā*, meaning a thorough scientific investigation. The term, *pramāṇa,* has never been used in Ayurveda in the same sense as it is used in other philosophies, but it stands for measurement or *quantification* of a substance or drug. The very fact that the term *parīkṣā* is used in Ayurveda to mean *pramāṇas* of other philosophies, denotes that the entire concept of *pramāṇas* must be quite original to Ayurveda and not borrowed from any other documented sources.

Means of Acquiring Knowledge

According to Agniveśa, the whole universe is divided into two, viz., the Real and the Ephemeral, and can be understood by four methods: (i)Scriptural testimony (*āptopadeśa*); (ii) Direct perception or observation (*pratyakṣa*); (iii)Inference (*anumāna*); and (iv) Reasoning or experimental confirmation (*yukti*).

Scriptural Testimony (āptopadeśa): A synonym of *śabda pramāṇa*, scriptural testimony denotes advice or a recorded statement of an authoritative source. In Ayurveda the authority (*āpta*) is defined as the one who is enlightened and refined, free from the predominance of *rajas* and *tamas* by virtue of his penance and knowledge, who has an uninterrupted knowledge of the past, present and future and one whose words are true and beyond doubt. The words or works of such a person(s) form *āptopadeśa*. This is true even today. Text books of great personalities in their respective fields are quoted for authoritative knowledge. For example Savill's *Medicine*, Boyd's *Pathology*, Gray's Anatomy, *Ten Teachers' Midwifery*, *Love*, and Bailey's text book on Surgery and the like are in the

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form of *āptopadeśa*. Caraka states: '*Āptas* are those free from doubts, with unimpaired memory, and who observe things with detachment and therefore their statements are reliable' (*Vi*. IV.4).

In any case, of the three methods of investigation, *āptopadeśa* is considered as the primary one as it forms the first reliable source of information about Ayurveda. For those who have already acquired the basic information about Ayurveda, the remaining two methods alone are stated to be adequate. *Āptopadeśa* helps in knowing the cause, the signs and symptoms, the location of disease, prognosis, nomenclature and the line of treatment of a disease. It also leads to a proper understanding of the conceptual part dealing with all aspects of practical utility—the names, types, properties, actions, habitat, deleterious effects, if any, the dosage and the form in which a drug or a herb is to be administered. It is important to note that Ayurveda advises not only the selection of a student but gives equal importance to the selection of a teacher who can be an *āpta* in the sense described above (*Vi*. VIII.3). The qualities of a teacher to be chosen by a student are the same as those of an *āpta* as defined above. For this reason, Ayurveda stresses the importance of *āptopadeśa*. In all philosophies, however, it is direct perception (*pratyakṣa*) that is regarded as primary and described first.

Direct Perception (Pratyakṣa): After obtaining the primary knowledge from eminent preceptors to enlarge his mental horizon , a medical student has to take recourse to *pratyakṣa* or direct perception and examination. The word, *pratyakṣa,* according to Caraka, is the cognition, definite and immediate, arising from the conjunction of the soul, the senses, the mind and the sense objects. The reason for this definition is not far to seek. For, the process of contact depends on the distance between the senses and their objects, presence of healthy condition of the sense organs, absence of any obstruction between the senses and their objects, application of mind, absence of the confusion or overshadowing in respect of similar objects. In the absence of the above factors, direct perception is bound to prove a failure, as Caraka states. (*Sū*.XI.8.)

It may be emphasized that the definition of *pratyakṣa* as provided in Ayurveda, also connotes the presence of soul and the mind which are considered absolutely necessary for the process of perception to be complete. The Nyāya philosophy, on the other hand, does not mention this aspect at all. But, while the Nyāya postulates *avyāpa-deśiatva*—*avyabhicāritva* and *vyavasāyātmakatva*—are not found in Ayurveda, the various types of *sannikarṣa* (contact) described in the *Nyāya* have not been described in Ayurveda. However, the conditions stipulated in Ayurveda where direct perception may be hindered are almost similar to the ones described in Nyāya philosophy.

Direct perception has been extensively employed in Ayurveda especially in the examination of a patient, his disease, and the identification of raw herbs as well as in the preparation of drugs. Nevertheless, the methods of perception are chiefly meant to examine the disease. This is clear from the very name of the chapter as *trividha roga viśeṣa vijñānīyaṃ* (*Vi* Ch.IV) wherein applied aspects of each of the methods are briefly discussed. There are five sense organs and each sense organ has its own object of perception. All but one (*rasanendriya* or the tongue) are helpful in examining a patient. Though the tongue

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helps direct sensory perception or experience, it is contraindicated in examining a patient as it is evidently an unhealthy practice. However, it is very useful in identifying the drugs based on their taste characteristics, and in deciding upon their administration. Caraka has described in detail the important aspects of *pratyakṣa* of each (*indriya*) and its application in Ayurveda.

The method of examination through the eyes has wide scope in the clinical practices of Ayurveda. Many names and synonyms of herbs are based on the perceived shape of some of their parts as well as their colour.

Another important method of examination is through *sparśendriya* (touch). Through this examination hardness or softness of any palpable mass or swelling (as in the case of elephantiasis), general anasarca, ascites, piles, or nodular enlargement, liver/splenic enlargement, stages of abscess and the like, can be ascertained. Similarly, hotness and coldness (as in the case of fever), inflammation, swelling, *prameha*, *pakṣāghāta*, *vātarakta* etc., can be easily recognized. Mobility as in the case of an abdominal palpable mass or any lump beneath the skin like a cyst, roughness of the skin, and other conditions can also be perceived. Signs which can be recognized by touch are described in the context of the description of several diseases, since it helps in understanding both normal and abnormal features of the different parts of body. The physical constituents are divided into *mātṛja* (having the mother as the original genetic source) and *pitṛja* (having the father as the genetic source). The former are stated to be soft and the latter, hard by nature. When these qualities are lost in any organ it is considered abnormal—an unhealthy sign. This is also an instance where examination by touch is practically applied.

The third method known as *śabda parīkṣā* (examination by sound) is useful in knowing the presence of any abnormality in sound such as—borborygmus due to collection of gas in the bowels, crepitations from joints, or adventitious sounds produced in any part of the body (respiratory sounds, heart sounds, or murmurs), percussion dullness in ascites or tympanic sounds as in accumulation of flatus in the intestines. This is also a useful method for testing the medicated oil and ghee preparations while they are being prepared. Certain characters of the voice and the absence of sound where it normally should have been are helpful in understanding the features of possible ensuing death and these are designated as *ariṣṭa lakṣaṇas* (bad characteristics) in Ayurveda.

The fourth sense called the *rasanedriya parīkṣā* (examination by tongue) has already been dealt with briefly. This is generally not resorted to for the examination of a patient, obviously for its cumbersomeness to the physician. However, Ayurvedic texts mention the abnormal taste of sputum, blood, vomitus or urine in disorders like *kāsa* (cough), *raktapitta* (bleeding disorder), *chardi* (vomiting) and *prameha* (diabetes). Nevertheless, in these diseases, the tastes are not to be tested by direct perception, but inferred; for example in the case of diabetes it is stated that the whole body becomes *madhura,* and urine also tastes *madhura* (sweet). This is inferred by the fact that the urine of such a patient attracts ants and the body also attracts flies. It is believed that these tiny animals understand the sweetness of urine or of the body by their *rasanendriya*. The role of this sense organ is, however, very much limited in the art of diagnosis. Nevertheless, it is extensively used for knowing the taste of medicinal drugs (an important determinant)

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which are classified into six groups on the basis of their tastes. The concept of *Rasa* (taste) in Ayurvedic pharmacology is unique and needs some elaboration to understand the importance of knowing the taste of drugs.

Six tastes: According to Ayurveda, the six tastes are: sweet (*svādu*), sour (*āmla*), salt (*lavaṇa*), bitter (*tikta*), pungent (*ūṣaṇa*) and astringent (*kaṣāya*). Each taste is constituted of two predominant *bhūtas* or basic elements (*pañcamahābhūtas*) as follows:

Svādu	=	*Prthvī*	+	*Ap*
Āmla	=	Tejas	+	Pṛthvī
Lavaṇa	=	Ap	+	Tejas
Tikta	=	Ākāśa	+	Vāyu
Ūṣaṇa (*Kaṭu*)	=	Tejas	+	Vāyu
Kaṣāya	=	Pṛthvī	+	Vāyu

To each taste is attributed certain qualities and actions. Therefore, the awareness of taste is essential to understand the action of a drug which has a specific taste, and on this basis a drug can be identified. For example: *Āmalakī* (*āmla*); *marīca* or pepper (*kaṭu*); *drākṣā* or grape (*madhura*); *hārītaka* (kaṣāya); *nimba* (*tikta*); and *saindhava lavaṇa* or rock salt (*lavaṇa*).

The fifth and the last method of examination relates to the olfactory sense: the foul smell of faeces, urine, sweat, vomitus, flatus, pus and chronic wounds as well as sweet odour from urine or skin, would provide diagnostic clues for several diseases as well as the stages of their affliction. Many drugs are also identified by their odours: *ugragandha*, *pūtigandha* and *ajagandha* etc. as also medicated oils, ghee, *avalehyas*, and powders of raw or prepared drugs. Even food and medicines are required to have pleasant odour in order that a patient can easily consume them.

Thus all the five direct perceptions based on senses are made use of extensively in Ayurvedic clinical methods in addition to *anumāna*, *yukti* and *praśna parīkṣā* which are described below.

Inference (Anumāna): Inference is an important method of examination which is followed by perception. It is related to the present, past as well as future, and is of three types, viz.,: (i) inference of the cause from the effect (eg. by pregnancy sexual intercourse is inferred, and hence is related to the past); (ii) inference of the effect from the cause (eg.- production of fruits by seeds, related to future); and (iii) inference in general—(fire from the smoke relates to the present).

The first two are known as *pūrvavat* and *śeṣavat* respectively in the *Nyāyasūtra* and the third is *sāmānyato dṛṣṭa* of Nyāya philosophy. Caraka defines *anumāna* as a logical conclusion based on reasoning. By the correlation of these definitions, it may be conjectured that a valid inference involves (a) direct perception of some event; and (b) reasoning that leads to the knowledge of either the cause or the effect or both. Nevertheless, Ayurveda is well aware that the scope of direct perception is rather limited and that the scope of comprehension by other means is unlimited. Therefore, inference is given equal importance for obtaining valid knowledge.

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There is, however one aspect which needs some mention, namely, that Ayurveda subscribes to the *Karma* theory or the law of *Karma* (past deeds) also by inference. For, the diseases are classified as *karmaja* (due to the deeds of one's past life), *prajñāparādhaja* (due to the deeds of this life) and both *karmaja* and *prajñāparādhaja*. As the causes of some diseases are considered to be past deeds, it necessitated a means to confirm the theory of birth and rebirth. This cannot be directly perceived and hence scriptural testimony (*āptopadeśa*) and inference are relied upon to prove the existence of rebirth and the Law of *Karma*. Caraka states that the actions (good or bad) performed in previous life have their effects and this is called *Daiva*, and that the actions performed in this life may yield results in the present or a future life, in the same way as the seed is inferred by the fruit, and its fruit by its seeds.

Be that as it may, it is important to note that the detailed examination of a patient is also carried out by inference. The power of *Jaṭharāgni* (digestive power) is inferred by the quantity and quality of the food consumed and digested. If heavy food, both in quantity and quality, is digested by a person relatively easier and earlier, the digestive power is considered strong; otherwise weak. Since the type of food and medicine and their dosage largely depend on the digestive power, the potency of this power is to be ascertained by inference.

It is common knowledge that physical strength is estimated by the amount of exercise one can withstand; the health of all the senses by the power of perceiving the respective objects; the mental status, by the power of grasping, thinking, recollecting, guessing or meditating as well as concentration; and intelligence, from the power of comprehension or memory. These are some instances of inference that are practically useful in clinical medicine. There is no denying the fact that many symptoms of several diseases can be diagnosed by inference only. For example, when a patient complains of stomach pain after 2 to 3 hours of taking food every day, it is inferred that he may be suffering from duodenal ulcer (*pariṇāma śūla*); a tympanitic sound on percussion of the abdomen suggests accumulation of gas in the intestines; a shifting dull sound on percussion of the abdomen suggests the accumulation of fluid (*udaka*) in the peritoneal cavity; and pitting on pressure denotes the excessive accumulation of interstitial fluid. An exhaustive account of the practical utility of inference in Ayurveda is beyond the scope of this chapter. It must, however, be emphasized that *praśna parīkṣā* or questioning, or the interrogative approach, is an accessory method which Ayurveda has adopted. But no philosophical system has considered *praśna* as a separate means (*pramāṇa*) of acquiring knowledge of a disease .

Yukti (experimental confirmation) : *Yukti* is another recognized *parīkṣā* (*pramāṇa*) in Ayurveda, although several physicians do not consider it that way. Even Chakrapaṇi, the noted commentator of the *Caraka saṃhitā* does not regard it as a separate one, but considers it as an ancillary of inference only. Some Buddhist philosophers such as Shāntirakṣita and Kamalaśīla (8th century A.D.), however, consider *Yukti* as an independent *pramāṇa* and give credit to *Caraka Saṃhitā* for this fourth method of investigation.

An objective look at this approach is essential to interdict the historical dichotomies existing in this regard. The term, *Yukti,* is derived from the root, *yujir yoge,* with *ktin* as

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pratyaya meaning experimentation (*prayoga*). It is important to recognize that Ayurveda is an applied science in which the patient and his disease are to be rationally and completely examined to determine the mode of treatment. This requires that the physician should have some prior theoretical knowledge of the subject on the basis of which a disease is cognized. But there would be some other factors that are not cognizable to sense-methods. In such a situation, the opinion that *yukti* is a form of inference only does not hold good. Caraka, while defining inference has clearly stated that it is a logical approach based on *yukti*. In this connection the following statements of the *Caraka saṃhitā* are worthy of note :

(i) A plant grows as a cumulative result of watering, ploughing, and sowing the seeds in an ideal season. This was valid in the past, is valid in the present and will be valid in the future. A rational understanding of these factors together is in the nature of an experimental confirmation. The growth of a plant is the consequence which can be directly perceived. Likewise, it may be readily inferred that the foetus comes into existence by the union of *pañcamahābhūtas* and the soul (*Sū*.XI.23).

(ii) Cumulative action of the churned, the churning stick, and the act of churning itself brings forth the fire. Similarly when a physician, patient, nurse, and the drug, with their respective qualities, join together, the act of treatment comes into being. *Yukti*, as a *pramāṇa*, has been made controversial by some authors of later periods, probably due to a prejudice or their inability to understand the concept in the proper context.

In any case, the Ayurvedic preceptors should have felt that the three methods cited earlier are not always adequate and, therefore, one more method of examination, namely, experimentation or testing (*yukti*) should be adopted.*Yukti* is defined in the *Caraka saṃhitā* as an intellectual perception or understanding of an object or event consequent upon the union of two or more causative factors, the result of which would be true in the past, present and future.

For example, the application of oil in a condition known as *āmavāta* would increase pain, while hot and dry fomentation would relieve it. This is a test for diagnosing this disease and this experimentation-based observation is *yukti*. Another example of experimentation is to diagnose an internal abcess by applying a wet paste on the suspected region. If it dries up early, it is concluded (*yukti*) that it is an internal abcess. In certain cases of indigestion or intestinal disorders, the faecal matter may contain undigested particles, this condition is called *āma mala*. Normally the stools should be *pakva* (mature with a brown colour). To ascertain the *pakva* or the *āma* state of stools, there is a test in which stool mass is placed in water and observed as to whether it sinks in the water or floats. If it floats, it is considered as *pakva,* and if it sinks, as *āma mala*. The above experimentation is *yukti*.

The term *trivarga* (three categories: *hetu varga*, *liṅga varga*, and *auṣadha varga*) mentioned in the *Caraka saṃhitā*, has to be properly understood with reference to the cited context. It should be taken to mean that *yukti* is useful for understanding the three

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categories. In modern parlance, *yukti* meaning experiment or test, should embody all the modern laboratory investigations (x rays, scanning, microscopic examination etc.) used for diagnostic purposes.

Principles of Debate: Another topic described in Ayurvedic classics is *Vādamārgapada*, (similar to *Nyāya*) meaning certain logical terms which a physician should be acquainted with, while participating in debates. It was indeed binding on an Ayurvedic physician to master the art of elocution in order to enhance the dignity of his profession. A student of Ayurveda was strictly canonized to follow certain rules of conduct and behavior, one among them being that his speech should be pleasant, clear, righteous and truthful. The three methods to achieve this goal, according to the texts, are: (i) *adhyayana-* (regular study); (ii) *adhyāpana* (teaching others) and (iii) *tadvidyā saṃbhāṣā* (professional debates or discussions). The last one was important for the professional exchange of ideas and practices, then as now.

It became, therefore, necessary for Ayurveda to lay down the principles of debate within the framework of which a student was trained to attain mastery over the art of debate. In this context it is not surprising to note that the description of the classification of discussion in general, the type of discussion either to be avoided or to be engaged in, the mode of expressing indignation, the mode of interrogation and answering, have been exhaustively dealt with in Ayurvedic classics along with the qualities of good and bad participants as well as the types of assembly.

Good qualities of participants	*Bad qualities of participants*
(i) Knowledge of the text	(i) Irritation
(ii) Practical experience	(ii) Lacking skill
(iii) Power of retention	(iii) Cowardice
(iv) Presence of mind	(iv) Lack of power of retention of ideas
(v) Eloquence	(v) Carelessness.

Three types of assembly have been mentioned by Caraka-friendly, neutral, or prejudicial. Practical strategies to be adopted while participating in discussions with superiors or neutrals or equals, have also been described in the *Caraka saṃhitā* with a note of caution that in an assembly of learned people, the wise will never appreciate quarrel. The text gives 44 logical terms which a debater should be acquainted with, each one of them having been defined with suitable examples, mostly from the Ayurvedic point of view. These canons of exposition, according to some scholars, are also found here and there even in Nyāya philosophy.

It may be noted that the Nyāya philosophy does not appear to have considered the practical strategy or tactics of discussion as being of much importance, while Ayurveda has dealt with this aspect in considerable detail. Further, not a few of the canons of exposition have been succinctly used in Ayurveda. For example, *ātmapratyakṣa* is regarded by Ayurveda in terms of perceptions like misery, desire, hatred and the like that are causes or features of several diseases. There are other logical terms like *aupamya* (analogy), *jijñāsā* (inquisitiveness) and *abhyanujña* (confessional) which have more

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significance in Ayurvedic debate than in the *Nyāya. Nigrahasthāna* (points of defeat) as an effective strategy has been dealt with in considerable detail in Ayurvedic classics.

In the Nyāya system, the word, *hetu*, connotes the means of obtaining knowledge. These include direct observation (*pratyakṣa*); inference (*anumāna*); relation (*aitihya*); and analogy (*aupamya*). In Ayurveda, this term is used to denote at least two meanings: (i) the cause of any effect or creative cause (*utpādaka hetu*); and (ii) the cause which imparts knowledge or illustrative cause (*bodhaka hetu*). The *Caraka saṃhitā's* definition of *hetu* has certainly a wider connotation than that of Nyāya philosophy.

For a physician, as noted before, a professional debate is essential for sharpening his skills. In a debate one has to propose some statement and the other has to oppose it, both being guided by a set of rules governing the debate. Finally one has to win and the another has to be defeated. The factors in favour of winning and those leading to defeat or circumstances when one can conclusively be declared defeated have been discussed in the *Caraka saṃhitā* under one major heading called *vādamārgapāda,* meaning canons of exposition. The speciality of the Ayurveda in this context is that all the examples are quoted from Ayurvedic point of view, to make each definition clear, with examples relating to either drugs, diseases or concepts (both material and spiritual). It should, however, be noted that examples from outside Ayurveda have not been given, because, strangely, a physician was strictly forbidden to debate with non-Ayurvedic experts or on topics other than Ayurveda.

Vaiśeṣika Darśana and Ayurveda

Vaiśeṣika philosophy has been briefly described in the Appendix. The postulate and the discussion of six categories (*ṣatpadārthas*) form the major contents of the *Vaiśeṣika* system, one of the six orthodox philosophical expositions. The six *padārthas* are: *dravya* (substance); *guṇa* property or (attributes); *karma* (action); *sāmānya* (generality); *viśeṣa* (particularity) or specialty; and *samavāya* (inherence). There is also a seventh category called *abhāva*. The term *padārtha* and its meaning have been explained under *tantrayukti* in the *Caraka saṃhitā, Suśruta saṃhitā and Aṣṭāngahṛdaya,* and this forms the last chapter of these classics. However, the *padārtha* as described in *trantrayukti* has no categorization as in the philosophical texts. On the other hand, all that has been described under *padārthas* in the philosophical texts finds a place in Ayurveda, except *abhāva*, especially in the *Caraka saṃhitā.* This exposition is found in the very first chapter of this text, not under the heading *padārthas,* but under the term, *kāraṇas* (causes of action). It has been explained that the sages by their intuitive knowledge had understood the six categories of knowledge pertaining to three aspects, namely, *hetu* (cause), *liṅga* (characters) and *auṣadha* (medicament) applicable to both health and ill health (*svastha* and *ātura*).

The six *padārthas* or substances culminate in effects and refer to the causation or the maintenance of equilibrium of all the bodily elements like *doṣa, dhātu* and *mala* (vitiators, tissues and waste products of the body). An elucidation of the Ayurvedic concept called *kārya-kāraṇa siddhānta* or cause and effect theory, is necessary at this stage.

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It is well known that the twofold objects of Ayurveda are to maintain health and to alleviate disease. The state of health is described as the state of equilibrium of the bodily *doṣas* viz., *vāta, pitta* and *kapha* as well as the two primary attributes of mind, namely, *rajas* and *tamas* constituting *mānasika* (mental or psychological) vitiating factors. Their disequilibrium leads to illness. The stages of both equilibrium and disequilibrium have their own causes (both physical and mental). Here health or ill health is *kārya* or effect which has *kāraṇas* or causes. Thus, as mentioned already, Ayurveda is the knowledge comprising three factors, viz., *hetu* (cause), *liṅga* (characters); and *auṣadha* (treatment) pertaining to either healthy or unhealthy persons.

The concept of the relation between a cause and its effect encompasses everything in the physical world. Naturally a disease, curability or incurability of a disease, the therapy or a drug to be administered, the fixation of dosage or proportion of drugs to be combined in any preparation, the time of administration of a drug, the dietary regimen before, during, and after a disease, the time and collection of a drug, rules of conduct or socio-cultural behaviour—all of these have respective known causes in their related contexts. In tune with this relationship, the *Agniveśa saṃhitā* commences its narration with a broad classification of *karaṇas* and their explanation in terms of *dravya, guṇa, karma* and their *sāmānyatva or viśeṣatva* in relation to the bodily elements that are responsible for the maintenance of health or the state of ill health. *Samavāya* is the sixth one denoting the inseparable relation of *guṇa* and *karma* in a given *dravya*. It should be emphasized that this is purely an applied concept unlike the philosophical concepts of *padārthas*. Though these terms are similar to *Vaiśeṣika padārthas*, it is to be borne in mind that they differ slightly in their meaning and scope as far as their practical applicability in Ayurveda is concerned. Keeping this in mind, each term caraka has explained in the *Caraka saṃhitā* (ch.I).

I. Sāmānya

The word, *Sāmānya* (generic concomitance), needs some explanation. This carries a sense of oneness in relation to others. It signifies homogeneity and is always a cause of augmentation (effect) of the others; in other words, it always enhances identical entities. But according to the *Vaiśeṣika* philosophy, it is neither the cause nor the effect of anything. Nevertheless, the augmentation is concerned with the effect only when it is related to the two objects having common characteristics and when both come together or in contact with each other. This view is in accordance with the references available in Ayurveda.

Nevertheless, this view does not hold that the concomitance always causes augmentation or increase under any circumstance. Such an augmentation is subject to two conditions: (i) homologous things should come in contact with each other or be counted together; and (ii) the absence of any inhibiting factor. The *sāmānya-viśeṣa* (general concomitance and particularity) theory of Ayurveda is different from the *Nyāya-Vaiśeṣika* philosophy. But it has important applications in Ayurvedic theory and practice.

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II. ***Viśeṣa*** is opposite to *sāmānya* conception.

III. ***Guṇa nirūpaṇa*** (explanation of properties)

Guṇa stands for the properties or qualities possessed by a *dravya* (substance). According to the *Caraka saṃhitā,* the substance is that factor which is a cause for the production of respective property or properties in another drug. Although Suśruta does not define *guṇa*, he regards these properties as physical or pharmaco-dynamic which can be identified by the action of a drug on the body (by inference).

The *Caraka saṃhitā* has described 41 *guṇas* as follows:

Śabdādi Guṇa (sound and other attributes): Ayurveda has described what are known as *śabdādi guṇas*, the five special properties of the *pañcamahābhūtas*. They are perceivable directly by sense organs and, therefore, are also called sense-objects : *Śabda* (sound); *sparśa* (touch); *rūpa* (colour); *rasa* (taste) and *gandha* (smell).

Sound: This is the inherent property of the element *ākāśa* and is directly perceived by the ears. According to Ayurveda, normally sounds are produced in certain parts or systems of the body as well as under certain abnormal conditions. Such sounds include the natural sound or voice. The normal human voice and the abnormal one have been categorized. A spontaneous manifestation of any abnormal voice in an individual without any known detectable cause indicates imminent death according to the *Caraka saṃhitā*. A respiratory disorder may be detected, at times, by an abnormal sound associated with it. The quality of sound produced suggests the type of vitiation that might have occurred in the tract. Some diseases like hiccough are identified with reference to the sound that is produced during the action of hiccoughing. The character of sound often helps differentiate one type of disease from the other. This is of great importance for clinical diagnosis.

Touch: This is an inherent property of *vāyu bhūta,* cognizable by skin, the tactile organ, by which cold, hot, soft, hard and the like could be felt. In many diseases pertaining to the viscera and also in the qualitative identification of drugs, these properties and hence touch play a significant role.

Colour or sight: This specific property of *tejas* is perceived by the eyes. Although colour is an important aspect, other aspects like the shape, size, movement, complexion, shadow, etc., are also no less important, as these are very useful in the identification of many drugs and diseases as well. The shape of the body, organs (both normal and abnormal), wounds or ulcers, swellings, tumours, abdomen, chest, teeth, face, extremities and the like, many a time give a diagnostic clue. Drugs like *lāngalī*, *simhāsya,* and *chakrāngi* as well as some surgical instruments have been named after their shapes.

The *Suśruta saṃhitā* has dealt with the role of elements in colour formation as follows:

Bhautic composition	***Colour***
Tejas + Ap	*Gaura* (white)
Tejas + Pṛthvī	*Kṛṣṇa* (black)
Tejas + Pṛthvī+ Ākāśa	*Kṛṣṇa śyāma* (bluish black)
Tejas + Ap + Ākāśa	*Gāuraśyāma* (whitish or light blue)

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Vaiśeṣika philosophy has not considered many of the following *guṇas* like heat, cold, light, hardness, etc. separately or independently although a few of these are mentioned by Praśastapāda, the authoritative commentator on the *Vaiśeṣika*.

Gurvādi Guṇas (heavy and other properties): According to Ayurveda there are twenty *guṇas* or properties called *āhāraguṇas* (in the food) or *śarīraguṇas* (in the body) as they are present in both food and body. Ayurveda regards that these are present variously in the five elements (*pañcamahābhūtas*) which are the constituent factors of a drug, and are both physical and biophysical. Medicinal herbs are also identified on the basis of these properties. Even the nomenclature of several drugs and diseases are specified after them, and various therapies too are described in terms of them. The biophysical aspects of these properties are inferred by the action they produce in the body subsequent to the administration of the food or drug.

Suśruta has considered more than twenty *guṇas*. But *sugandha* (fragrance) and *durgandha* (bad odour) are counted among special properties. He does not, however, define *guṇas*, but he describes each *guṇa* with reference to the physiological actions attributed to it, while such an exposition is not found in the *CS*. It may be stressed that the Ayurvedic preceptors had studied the properties with reference to food articles, medicinal herbs, minerals, bodily elements (*doṣa-dhātu-malas*) both in healthy and unhealthy conditions, *pañcamahābhūtas* (the five elements), *rasa* (tastes) of substances and others, not only with a view to determining the exact drug or food to be administered in a given condition of the body but also identifying the drugs, food articles and diseases.

Twenty *guṇas* and others are as follows: *gurú* (heavy); *laghu* (light); *śīta* (cold); *uṣṇa* (hot); *snigdha* (oily) *rūkṣa* (dry); *manda* (indolent); *tīkṣṇa* (fiery); *sthira* (stable); *sara* (itinerant); *mṛdu* (soft); *kaṭhina* (hardness); *viśada* (apparent); *picchila* (unctuousness or slimy); *ślakṣṇa* (smooth or shiny); *khara* (roughness); *sūkṣma* (subtle); *sthūla* (big/gross); *sāndra* (dense); and *drava* (fluid)—20. It may be noted that the above are mutually opposite qualities.

Buddhi (intellect); *icchā* (desire); *dveśa* (hatred); *sukha* (happiness); *duhkha* (misery); *prayatna* (effort)—6 (these constitute the *adhyātmika guṇas)*.

Parā (superior); *aparā* (inferior); *yukti* (observation); *saṅkhya* (computation); *saṃyoga* (conjunction); *vibhāga* (disjunction); *pṛthaktva* (separation); *parimāṇa* (quantity); *samskāra* (metamorphosis); and *abhyāsa* (practice)—10. (*Sū*.XXVI.29-30).

Explanations of some of the terms mentioned above are necessary in the Ayurvedic context. *Parā* and *aparā* are the terms indicating the degree of relative quality, superior and inferior relating to a region, potency or quality of a drug in the context of its effect on health. The *Vaiśeṣika philosophy* also has considered these two aspects, but their meaning and application are not similar to those in Ayurveda which has applied these two in a wider context.

Yukti as *guṇa* is different from the *yukti* described earlier. As a quality it means the proper application of therapy in an appropriate condition. The success of a treatment depends on *yukti* which, in turn, depends on the fixation of proper dosage and the time of drug administration. (*Sū.XXVI.* 31). In contrast, *Vaiśeṣika* philosophy does not mention this aspect at all.

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Sankhyā or computation refers to the number of vitiating factors, *dhātus* and waste products, diseases and their types. It also finds application in the classification of diseases like 80 types of *vātā* diseases, 40 kinds of pitta-diseases and 20 of kapha ailments. Besides, the term *Saṅkhya,* refers to the numeration of drugs like *triphalā* (three fruits), *pañcamūla* (five roots of common action), and *saptaparṇī,* (having seven leaves) for practical identification of the herbs or plants used in Ayurveda, unlike in the *Vaiśeṣika.*

Saṃyoga (conjunction) denotes the augmentation or reduction of the potency of a drug. To enhance their potency, drugs of similar action are to be added. But this also depends on the status or the stage of a disease. The combination of drugs should be such that it would be acceptable to a patient in terms of its taste, colour, touch and smell. In order to achieve this, even drugs of opposing qualities or actions could also be combined. The Ayurvedic approach is again in sharp contrast with that of *Vaiśeṣika* which regards *saṃyoga* as being physical and general; likewise *vibhāga* (disjunction) and *pariṇama* (effect).

Saṃskāra (metamorphosis) represents the processes which bring about change in the natural qualities of a substance. Food and medicines are prepared through some processes like washing, churning, milling and soaking which influence the quality of the products. The medicinal potency is also increased by certain processes, like steaming, triturating and the like which help remove the physico-chemical impurities and thus enhance the potency of mercury and other metals or minerals used as medicines.

Pañcamahābhūtas (Śabdādi guṇas): Ayurveda believes that the entire body is composed of five elements and hence every part of it has the properties, both special and general, pertaining to these elements. Since these properties are detectable both in normal and abnormal conditions, they are useful in the diagnosis of a disease, besides being helpful in the identification of medicinal drugs (herbs and minerals) as well as food articles that are conducive to health. For an Ayurvedic physician, it is essential to know all the above properties.

IV. Substance (dravya)

According to Ayurveda all substances too are composed of five elements. But this concept refers only to the produced ones, and not to the causative ones like the five elements, soul mind, space and time as described in the Vaiśeṣika philosophy and also in Ayurveda in a different context. It should be emphasised that Suśruta also refers to the substances as drugs and classifies them as *jaṅgama* and *sthāvara*, while Agniveśa (Caraka) classifies them as *cetana* (with life) and *acetana* (without life) in so far as they pertain to living beings and physical matter, because the former connotes that which has sensory organs while the latter refers to those that are devoid of sensory organs. The *jaṅgama* group consists of placental bodies; birds and others born of eggs; worms regarded as being born of sweat; and frogs stated to be coming out of sprouting. Further, constant flowers and fruit-bearing plants, even those bearing fruit without explicit flower, shrubs, creepers as well as the plants which bear fruits once in their life-span and then perish, belong to the

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group called *audbhida*. Minerals and metallic constituents are referred to as *pārthiva* (out of the earth).

The physical matter is classified further into several types in relation to their elemental compositions, physical nature, sources of origin, utility, tastes, action on different *doṣas* and dietary qualities.

The *dravya* is classified on the basis of the predominance of a specific element in it as follows: *pārthiva, āpya, vāyavīya, āgneya* and *ākāśīya*: Certain physico-pharmaco-dynamic properties have also been attributed to each *dravya* of this group. These enable a physician to identify and select the drug which is appropriate for treating the given condition of a patient.

What is more significant, however, is that Ayurveda regards all materials as medicines (*auṣadha*) depending upon their application or practical utility. Some have more nutritional value while others have more medicinal value or only medicinal value. The former group is called *āhāra* (food) in which their taste plays a dominant role. In the latter group the properties such as cold and hot have their medicinal effects and hence they are called *auṣadha*. Rice, wheat, grams, vegetables, milk and the like are examples of the former group, while *hāritakī, citraka, amṛta* etc., are illustrative of the latter group. The palliatives and other substances which help maintain body equilibrium have also been categorized; likewise several others on the dietary basis and in the framework of *pañcamahābūtas*.

The enumeration of 9 causative substances in the *Caraka saṃhitā* begins with *khādīni*. The term *khādīni* is interpreted as *ākāśa* and other four elements (*pañcamahābhūtas*)–an approach generally followed by almost all the scholars of later period. This, however, appears to be a misnomer because, though Caraka has not used the term *pañcatanmātra* (the five subtle states of the elements) anywhere, it does not mean that he did not accept their existence. It appears that the term *khādini* (*ākāśa* etc.,) has been used in the *Caraka saṃhitā* to mean *tanmātras*. Therefore, as enumerated by him in the first chapter on *Śarīra* in the context of the enumeration of the 24 principles, the word, *khādini* should stand also for the five *tanmātras* which deserve to be considered as *kāraṇa dravyas* along with soul, mind, time and space which put together are nine *kāraṇa dravyas*, according to Agniveśa. They are also termed as *arthaḥ* meaning *śabda* (sound), *sparśa*(touch), *rūpa* (colour), *rasa* (taste) and *gandha* (odour) *tanmātras* in other philosophies as well as in the *Suśruta saṃhitā*. The *Caraka saṃhitā* speaks of them as *sūkṣmabhūtas* (minute elements). The *pañcamahābhūtas* are only the grosser manifestation of minute forms.

The tanmātras (sūkṣmabhūtas) and their specific attributes

Ākāśa	=	*śabda*
Vāyu	=	*śabda* + *sparśa*
Agni	=	*śabda* + *sparśa* + *rūpa*
Ap	=	*śabda* + *sparśa* + *rūpa* + *rasa*
Pṛthvī	=	*śabda* + *sparśa* + *rūpa* + *rasa* + *gandha*

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Evolution of pañcamahābūtas and their attributes

Sūkṣma bhūtas	***Mahābhūtas***	
Ākāśa	*Ākāśa :*	*only śabda*
Ākāśa+Vāyu	*Vāyu:*	*śabda + sparśa*
Ākāśa+Vāyu+Agni	*Agni:*	*śabda + sparśa + rūpa*
Ākāśa+Vāyu+Agni+Ap	*Ap:*	*śabda + sparśa + rūpa + rasa*
Ākāśa+Vāyu+Agni+Ap+Pṛthvī	*Pṛthvī*	*śabda + sparśa + rūpa + rasa + gandha*

Manas (Mind)

One of the nine *kāraṇa dravyas,* the mind is an internal instrument helping a person to experience happiness or sorrow in his gross body. It is always associated with a person either in his gross body which would have been influenced by the actions of his previous birth or the microcosmic body (*liṅga śarīra*) till he gets liberated from bondage.

Five sense organs, five motor organs, mind, and intellect are considered as *kāraṇa* (instruments). As the mind gets associated with both sensory and motor organs, it is dualistic (*ubhayātmaka*). (*Sū.Sa.*I.4.)

Ayurveda considers that the mind in the macrocosmic body, is *pañcabhautik* (five elements) (*Śā.*IV.17) and composed of the five elements, while Sāṅkhya philosophy considers it to be an evolute. In addition, according to Ayurveda, the mind has three attributes viz., *sattva, rajas,* and *tamas.* The latter two are considered to be *doṣas* or those that get vitiated and are capable of vitiating others. (*Sū.*IV.36.; I.57). The nature of knowledge, indulgence, ignorance etc., of mind are based on the predominance of these three attributes. The nature of action, behaviour and conduct are generally found expressed in accordance with each attribute. Individuals may vary from one another according to their mental activities which in turn depend on the preponderance of either one or the other of the three attributes. Nevertheless, the term, *sattva* is used as a common synonym of mind in Ayurvedic texts, a notable departure from the way it is explained in philosophical texts. Thus Mind is also regarded as beyond the perception of senses (*atīndriya*) (*Su.*VIII. 4).

The mental processes of distinct and indistinct knowledge are not as clear in Ayurvedic texts as they are in Sānkhya philosophy which states that a contact of external senses and their objects can produce indistinct knowledge, while internal factors comprising the mind, ego and intellect lead to distinctive knowledge to determine what is acceptable or rejectable (*Śā.*I.22-23).

***Attributes of mind*:** Structurally the mind is considered to be atomic and only one in the gross body (*Śā.*I.19). However, it appears to be multiple in character due to the variations in the experience of its objects and their perception by the sense faculties, its disposition, and also its contact with the three attributes as noted before. But, Caraka emphatically says that actually there is no multiplicity of mind and that it does not motivate more than

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one sense faculty at a time, and hence all sense organs are not active simultaneously. It may be noted that the Nyāya philosophy also opines similarly, advancing substantial arguments supported by suitable examples (*Nyāya Sū*.3.2.61).

Seat of diseases: Ayurveda considers the mind as a substratum of diseases, besides the body (Ca.*Śa*. 1.55; Sū.Sū. 1.26). Thus diseases are classified as those occurring only in the body like skin disorders, only in the mind like anger, lust, hatred, fear, etc., and those of both body and mind such as *apasmāra* (epilepsy) and *unmāda* (insanity). (*Sū*.I.55; Cakrapāṇi; Su.Sū.I.26 (Ḍaḷhaṇa).

Ordinarily either a purely physical or purely psychic disorder is rarely found. Most diseases are psychosomatic (*vimāna* 6.8-10 and Cakrapāṇi), each influencing the other. It should, however, be noted that Ayurveda considers mind as one of the seats of disease. In view of this, it would be essential to examine a patient's mental status also, along with the examination of his body and sense faculties. The personality of an individual is, therefore, considered from three angles: physical, psychological, and the *pañcabhautic* constitution. In fact, the *total personality* is a summation of these three.

Physical constitution (*prakṛti*) is determined by the characters attributed to each type and Ayurveda has enumerated seven types of *prakṛti*: *vātaja, pittaja, kaphaja, vāta-kaphaja, vāta-pitta, kapha-pittaja and vata-pittaja-kaphaja.*

Temperature, food habits, bowel habits, perspiration and physical strength, a general configuration, stature colour of the skin and hair, eyes, lips, tongue,teeth, gums etc., power of digestion and related aspects which are of physical nature are the determinants of *prakṛti*. The mental condition is also considered during clinical examination of physical constitution of a person.

The mental characteristics of the *vāta, pitta,* or *kapha* constitutions, according to Ayurveda, are as follows:

Vāta prakṛti	*Pitta prakṛti*	*Kapha prakṛti*
Cowardly	Bold	Bold, steady and firm
Unstable	Good orator	Forgiving
Feeble with grief	Arrogant	Devoted and faithful
Agonized with grief	Forbearing nature	
Humble	Energetic	
Ungrateful		

The combination of any two factors or all the three factors will result in mixed mental characters.

Psychic Aspects

Psychological constitutions or dispositions have also been described separately in the Ayurvedic classics, based on the view that the mind is basically a combination of three

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guṇas viz. *sattva*, *rajas* and *tamas*. According to Agniveśa, the psyche is of three kinds: (i) *sattva* (pure), (ii) *rajas* (energetic), and (iii) *tamas* (inertial). This is based on the three basic tendencies of the mind. Each *guṇa* is known for some specific tendency. Thus *sattvaguṇa* manifests itself in good and positive traits; *rajas,* in wildness, while *tamas* leads to a state of infatuation. The psychic constitution or personality is chiefly determined by the fact that one of the above tendencies is dominant in a person and such a dominance is expressed by a set of behavioural pattern. Based on these behavioural patterns, the mental constitutions (*mānasika prakṛti*) are divided into three types, *sātvik, rājasic,* and *tāmasik*, and are further sub-classified, and special behavioural patterns are explained for each sub-type. Thus several mental behavioural patterns have also been recorded in Ayurveda and they are to be examined for a proper diagnosis and also for adopting the proper line of treatment.

A comprehensive study of the mind of a person is also necessary for examining the immunity or resistance to diseases according to Ayurveda. This involves the tolerance threshold of the mind among other factors, such as dietary habits, physical constitution and the like (*Sū*.XXVIII.7). If a person is not strong-minded which is associated with other weak physical features, he is stated to have less tolerance for disease and remedial treatment. Therefore, it is necessary for a physician to examine the power or the strength of mind of a person. Viewed from this standpoint, patients have been considered to be of two types: (i) those who, though they are suffering from a serious illness, may appear to be suffering from a mild one because of the excellence of their mental strength and physical constitution; and (ii) those having a mild disease may appear to be suffering from serious illness because of their weak mental strength and physical constitution.

When the physician mistakes a patient suffering from a serious disease for one suffering from a mild disease and is under the impression that the quantum of vitiation morbidity in him is low, he administers elimination therapy which is mild in nature but not sufficient enough to eliminate morbidity to the extent desired. This in turn results in further aggravation of morbidity in the patient. On the other hand, when a patient suffering from a mild disease is mistaken to be suffering from a serious illness and the physician is under the impression that the quantum of morbidity is high, he administers a strong elimination therapy and it causes the elimination of morbidity in excess leading to the emaciation of the patient. In order to avoid such wrong diagnosis and wrong therapies, it is very essential to examine *sattva bala* (mental strength) along with other physical factors (*VI*. 7.3-7.)

Strength of mind is classified into three categories: (i) *Pravara* (superior); (ii) *Madhyama* (moderate); and (iii) *Avara* (inferior). Individuals having any of these are accordingly grouped as *Pravarasattva puruṣa, Madhyama sattva puruṣa and Avarasattva puruṣa.*

The first type of persons possess superior type of mental faculties characterized by good memory, devotion, gratefulness, wisdom, purity, excessive enthusiasm, skill, courage, valour in fighting,absence of sorrow, proper gait, depth of wisdom and sincerity in actions and virtuous acts, (*Vi*.VIII.119-120). Such persons are also called *Sattva sāra puruṣas.* (persons possessing the essence of mind (*Vi*.VIII.110). Even if possessed of a weak

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physique, they are able to tolerate serious exogenous and endogenous diseases, because of the specific manifestations of those qualities in them.

The second type of individuals tolerate pain and related manifestations by themselves when they realize that others can also tolerate it. At times they gain comfort and strength by listening to the wise counsel of others who have experienced such miseries and come to conclusion that they also can tolerate it. They do not feel that they are isolatedly suffering from miseries.

The third category of persons, because of their inferior mental strength, find it unable to sustain miseries either by themselves or through others, as advice given by others does not have any positive effect on them. Even if they have strong physique, they cannot tolerate even mild pain. They are susceptible to fear, grief, greed, delusion and ego. They may faint when they hear stories describing wrathful, fearful, hateful or terrifying episodes, or observe ugly sights such as severe wounds and profuse bleeding. Persons of this type may become pale, feel depressed, giddy or even go mad, and such situations may eventually lead to their death.

More importantly, the state of *pravara sattva* is essential for a surgeon as well as for the patient who is to undergo a surgical operations or to do strenuous work (*Sū.Śā.*37-38).

Karma Theory and Mind

There is, however, one aspect, namely, the *karma* theory, which needs to be mentioned here, insofar as it relates to the mind. Ayurveda believes that the variations of mental faculties of an individual are due to the impressions that are imprinted in the mind of the subtle body in a previous birth. It further believes that the mind is a connecting link between the soul and the physical body, and that a mind dominated by any of the *triguṇas* (*sattva, rajas,* and *tamas*) in a previous life, will be the same in the subsequent birth as well. Because of the continuity of the same mind, a person is stated to remember even events of his past life, although this power of recalling the events of past life rarely finds expression in individuals. Those who can recall the events of their past life are called '*jātismara*' (*Śār.*III.13; *Su.Śār.*II.57).

The concept of the effects of *karma,* so far as psychic inheritance is concerned, seems to have been an innovation of the sages who were involved in the evolution of Ayurveda, since nowhere else does this concept of *jātismara* appears to have been mentioned. As Ayurveda is essentially a practical medical science, but with a solid human-oriented philosophical foundation, it was the responsibility of the sages to answer the query as to why certain people are endowed with the power of recalling and whether such a mental act could ever happen, if so why does it manifest? The postulate of *jātismara or* remembering the past answers briefly these queries.

Yet another practical aspect of Ayurveda concerning the mind is its approach towards understanding the mental faculties according to the age of an individual. It is stated that in childhood (till 30 years of age) the mental activities are intertwined in nature. During the middle age, valour, power of understanding, retention, memorising, analysing facts

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and the like are well manifested. During old age (after 60 years of age) valour, power of understanding, retention, memory and the capacity to analyse start getting diminished gradually (*Vi*.VIII.122). In pursuance of its practical approach, Ayurveda has identified many causes both for mental and physical or somatic disorders as well as several characteristic features of both psychic and somatic diseases.

Physical diseases and psychic cause

Disease	*Cause*	*Ref. (Caraka saṃhitā)*
Vātajvara, (fever)	misery	I-19
Pittajvara (fever)	anger	I-22
Prameha (diabetes)	excessive misery	I-4.36
Kuṣṭha (skin disease)	fear	I-5.6
Kṣaya (tuberculosis)	fear, grief, anger	I-6.8
Cardi (vomiting)	fear	I-6.82
Pāṇḍu (anaemia)	lust, worries, fear or anger	XVI.16.9
Atisāra (diarrhoea)	fear, grief, worry or anger	XIX.6,8-9
Tṛṣṇā (thirst)	anger, grief	XIX. 22,6
Ulcer healing,	grief, anger	XXV.23
Hṛdroga, (heart disease)	fear, worry	XXVI.77
Aruci, (dyspepsia)	grief, greed or anger	XXVI, 124
Vāta vyādhi	(nervous worry and anger disorders)	XXVIII,16

Psychic Factors Influencing Health and Ill-health

Certain mental activities or urges are considered as harmful to one's well being in this life and hereafter. Therefore, one is advised to refrain from or suppress urges such as greed, grief, fear, anger, vanity, shamelessness, jealousy, too much of attachment and malice (*Sū*.VII.27). Grief is considered to be the worst among those mental factors that cause the aggravation of diseases. Cheerfulness is regarded as the best among the health-giving causes, and happiness is one of the best influencing factors for conception. Greed is considered as the most troublesome, while self–confidence is the best quality for recovery from illness (*Sū*.XXV.90).

Psychic Disorder: Insanity and epilepsy are also considered as mental disorders. The former is defined as a state of perversion of mind and intellect, deranged consciousness-knowledge, memory and desire, and erroneous manners, behaviour or conduct. Though the causes are mainly mental (*Ni*.VII.5), some physical causes are also held responsible indicating the interrelationship of the physical body and the psyche (*Ni*.VII.14). Epilepsy is also chiefly a psychic disorder in the sense that it is caused by the impaired *rajas* and *tamas*, characterized by occasional unconsciousness, due to the perversion of memory and intellect, associated with loathsome activities (*Ni*.VIII.5). In both the states, the physical and mental causes are adduced with regard to the psychic and somatic features. Even in

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the context of the treatment and prevention of sexual debility, a seemingly physical disorder, the role of the mind is also significantly mentioned. The *will* or determination to have sexual intercourse is pointed out in this context (II.19). Among the causes of impotency psychic factors like fear, lack of confidence in the opposite sex, grief and other factors are also included (II.43). The erection of the male reproductive organ is also dependent on the power of the mind or on desire and determination.

The Ayurvedic elucidation of causative factors in general for all diseases merits attention. The causes are classified into (i) unwholesome contact with objects of the senses; (ii) bad seasons, and (iii) impairment of intellect, patience and memory. The last one is called *Prajñaparādha* meaning errors of *prajñā* (intellect or mental activity) involving three functional faculties of the mind, namely, those of understanding (*dhī*), will power (*dhṛti)* and memory (*smṛti)*. Intellect is defined as that faculty which views things as they are, i.e., it helps correct or proper perception. If this faculty fails, the eternal is viewed as ephemeral, the harmful, as useful and *vice-versa*. Will power is that faculty of mind which can restrain or control the mind from excessive or wrong indulgence. If this faculty of mind is impaired, one cannot control one's mind from indulgence in wrong doing, nor withdraw from unwholesome things and deeds which are harmful to one's own health. Memory is that faculty which stores all memorizable events or things and helps recollect them whenever necessary. If this faculty also fails due to *rajas* and *tamas* in a person, he fails to recollect at a time when it is necessary from the point of view of his own health (*Śa*.I. 99-101).

Whatever an individual does in the context of the failure of mental ability as noted above, is categorized as *prajñāparādha*, a cause for many diseases. Even a physiological phenomenon like sleep is defined as that state of mind which gets exhausted or becomes inactive and withdraws itself from all sensory and motor organs (*Su*.XXI.35). Details regarding normal and abnormal sleep, proper time of sleeping, and its effect on normal health, sleep disorders, their causes and management, have been discussed in detail in Ayurvedic literature (*Sū*.XXI. 36-59).

Apart from psychic therapy, some drug therapy has also been advocated for curing mental disorders, which includes a composition called *medhya rasāyana* prepared from drugs considered to act on the mind. The fact that Ayurveda considers the mind as a *bhautic dravya* (substance) makes it clear that food articles and drugs which are *bhautic* in nature, would have their action on the mind. Physiological factors like *vāta-pitta-kapha* and *ojas* also are stated to have their influence on the functioning of mind. Thus mind and body mutually interact and influence each other both in healthy and in diseased states.

A natural question arises as to why differences in psychic temperament from individual to individual are observed and what determinants are responsible for these temperamental variations. In response to these questions, Ayurveda has postulated the following factors as being responsible for temperamental differences: (i) mental traits of parents (*mātṛ* and *pitṛ sattva*); (ii) behaviour, reading, thinking, hearing, etc., of the mother during her pregnancy period; (iii) deeds of a past life having impression on the subtile body; and (iv) practices which result in habits or frequent desires for a particular type of mental faculty by the progeny in his or her previous life (*Śā*.VIII.16). A close

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examination of the factors that are comprehended in Ayurveda reveals that they encompass a vast range of events from past life to foetal life, so far as the inheritance of mental traits of an individual is concerned. Mental disorders are stated to be treated by spiritual and scriptural means, by strengthening patience and memory, and by meditation, (*Sū*.I). The codes of ethical conduct prescribed generally for everyone also help in preventing mental disorders (*Sū*.VIII.18-19; 25-29).

MIND AND MANAGEMENT OF DISEASES

The treatment in Ayurveda is mainly categorized under three heads: (i) spiritual therapy; (ii) therapy based on reasoning (rational therapy) and (iii) psychic therapy. The first includes such measures as incantation of *mantras*, wearing of gems, auspicious offerings, gifts and oblations, observance of scriptural rules, atonement, fasting, obeisance to gods, going on pilgrimage, etc. The second one is concerned with the administration of proper diet and medicinal drugs appropriate to the given condition. The last one briefly refers to measures that would help withdraw the mind from harmful objects. The details of this therapy are not, however, recorded, although a few principles of therapy are mentioned here and there in the context of the management of a particular disease like insanity or epilepsy. The practical methods seem to have been left to the discretion of an experienced physician. A few instances of psychic management with actual context are given below.

Disease	***Psychic management***
Unmāda (insanity)	Spiritual therapy (*Sū*.VII.16)
Apasmāra (epilepsy)	Chanting mantras; offering *pūja* to Śiva and Ganeśa (CS. Śā.14;Sū.*Ut.* 61.15) to be freed from worry, anxiety, greed etc.; strengthening the mind through concentration.
Śokaja-bhayātisāra (types of diarrhoea)	Removal of tension of the patient; inculcating cheerfulness and happiness in him (CS. I. 19.12)
Kāma-krodhaja-jvara passion, anger	To be quietened by raising a patient's anger or desire respectively

Kāla (time)

The nature of, and actions due to time are also among the foundational ideas of Ayurveda, but are somewhat at variance with those of the Viaśeṣika philosophy. It is interesting to note that a synonym of time extensively used in Ayurveda is *Pariṇāma* (Vi.VIII.76), not only from the philosophic point of view but also the therapeutical procedure and allied aspects; for, there is no denying the fact that the success in treatment depends on the proper action of a physician, which in turn depends on proper dosage of a drug and proper *time* of its administration (*Sū*.II.19), with a view to obtaining its maximum benefit.

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Both curative and preventive measures have also been described with reference to appropriate time.

The proper time for dental hygiene, bathing and taking food on the one hand and, on the other, the administration of drugs at the appropriate time, are considered necessary for the maintenance of health. Caraka has stressed that, if proper care with reference to the time factor is not taken by a physician, it may lead to complications. He has also thrown light not only on the dietary regimen, after a major elimination therapy, vis-a-vis the time of such a regimen but also on the time factor which is one of the natural causes of accumulation, aggravation or palliation of *doṣas*. It has been recognized that old age is a cause for insomnia, as a result of the depletion of *ojas* (responsible for immunity) in advanced age. Like modern medicine, Ayurveda also believes that the administration of drugs which are effective, can even be harmful if they are not consumed at the appropriate time and any therapy which is not in tune with proper time, may turn injurious to health. Further, according to Ayurveda, pathological process varies with time, because the three *doṣas* are definitely related to time as they become dominant during a particular point of time (of a day, night and age). It has been pointed out that an individual who desires to become a physician should study medicine keeping in view the *doṣa* and time (*Vi*.III.38) and he should be able to treat a disease of the past, present and also of the future, in the sense that a disease should not recur in future(*Śā*.I.86-94). Childhood, middle age and old age are considered respectively as morning, noon and evening of a day or first, second and third quarter of night. Whatever diseases are common to these ages, they are called time-related disorders.

Ayurveda has prescribed not only the daily and seasonal life-style for maintaining health as well as body equilibrium but also the appropriate time when each part of the medicinal plant would have the most potential to act. Agniveśa states that the Ayurvedic *kāla* (time) is that period during which a drug acts effectively. It is important to know the time that a drug takes to commence its action as well as the duration of its action, specially in the administration of laxatives, emetics, sleep-inducing, or pain-killing drugs. It is emphasized that different types of medicinal preparations have different time limits after which they lose their potency. The time of administration of medicine is not common to all patients, nor to all diseases, according to Ayurveda. There are different times for administering medicines in different conditions of patients. The time for giving medicine is related to the time for food and also the mode of administering medicine along with food. The various modes of administering Ayurvedic drugs are included in Appendix-III. This is not, however, the actual division of the time factor itself. Suśruta has given an account of the division of the time (*Sū.sū*.VI.9) from the minutest (time required to utter one light syllable or one twinkling of an eye-*akṣinimeśa or mātrā*) to the largest unit (five years called *yuga*). According to him, the *rasa dhātu* (nutrient) nourishes the other *dhātus* in 3015 *kalās* (time units) and the same time is required for the formation of each successive *dhātu*. Caraka, however, has a different opinion and says that the *dhātus* and other tissues are nourished continuously like a moving wheel (ch.XV). In any case, Ayurveda has accorded due position to time in its medicinal scheme.

In tune with the social attitude, then as now, auspicious and inauspicious times were also prescribed for therapeutic as well as surgical processes. These have astrological

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nuances and some Ayurvedic physicians keep these also in view. In any case, *muhūrta* as a specific unit of time (about 48 minutes) is also used in the context of elimination therapy, where a physician is advised to watch the patient for one *muhūrta*, which means that the administered drug action will commence after this duration.

Ṛtucaryā (seasonal conduct) in Ayurveda is one of the major preventive measures of diseases. The basic postulate behind this concept is that the biological environment, both within and outside an individual, positively responds to the atmospheric or ambient changes. Hence, attempts should be made towards a harmonious adjustment of psychosomatic functions with changing seasons. The observance of *ṛtucaryā*, along with other healthy measures, will not only prevent a host of diseases which might otherwise occur during a season, but will also preserve and enhance the immunity in general. Based on the type of solar influence that is exerted on the earth's atmosphere, the seasons are divided into *ādāna* and *visarga* in the Ayurvedic classics. These correspond to *uttārāyana* and *dakṣiṇāyana* (the Sun's northerly or southerly movement respectively). The first is considered as *āgneya* (hot or fiery) and the second, *saumya* (mild or cool).

A notable aspect of Ayurveda, as mentioned in Suśruta, is that *ayana* (the Sun's movement northward or southward) has been viewed from the health point of view of individuals by relating it to the possible but gradual decrease or increase in their physical and mental strength on the one hand and, on the other, to the dominant tastes of plants and herbs (both food and medicinal) during this period so as to enable a physician to make suitable adjustments in the therapeutic care of his patients.

Apart from the divisions of time mentioned above, Ayurveda also speaks of *tithi* (a lunar day), *karaṇa* and *nakṣatra* (asterism), three of the five components of *Pañcāṅga*-Indian ephemeris-which have to be taken into consideration before commencing any therapy like emesis and purgation. It is enjoined that such procedures are to be performed by administering respective medicines during an auspicious lunar day, *karaṇa* and favourable asterism (*Sū*.XV.17). For this purpose, asterisms were classified into the auspicious and the inauspicious ones. Protective and predictive astrology in a way had crept into Ayurveda.

Kriyā kāla: Yet another aspect where the time factor is considered to be of no less importance is the Ayurvedic concept of *Kriyā kāla* (*kriyā* = treatment or action; *kāla* = time). It is indeed a unique determinant which is related to the appropriate time for adopting a proper line of treatment. The pathological process of a disease is divided into six stages: *sañcaya kāla* (stage of accumulation of vitiated *doṣas*); *prakopa kāla* (stage of *doṣas* getting provoked and tending to spread); *prasāra kāla* (the provoked *doṣas* spreading all over or to some other parts of the body from the place of their accumulation); *sthānasaṃśraya* (accumulated and provoked *doṣas* with their tendency to get stagnated in a particular area or spot which is inherently or otherwise weak); *vyakti kāla* (*doṣas* having stagnated in a weak spot causing the manifestation of symptoms of a disease); and *bhedakāla* (*doṣas* further strengthened by their respective causes leading to sub-varieties of the same disease or to other complications at that stage). This is a conceptual contribution of Suśruta in the field of pathology, and emphasises the need for treating or arresting the progress of a disease at the earliest time.

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Dik (direction)

Though *dik* or the direction is not clearly defined in the context of therapy, it is interesting to note that the Ayurvedic classics mention that the entrance of a labour room should be in the eastern or northern direction; likewise that of a hut specially erected for rejuvenation (*rasāyana treatment*). Other injunctions include the following: a patient should be asked to lie down keeping his head towards the east while a medicated enema is being administered (*Vi.*III.34); a patient should be posited facing the east while performing a major operation on him (*Su.Sū.*VI.22). Suśruta has provided details about the physical properties and biological actions of the wind coming from different directions (*Su. Sū.* XX.23-30) and the biological action of water from the direction of the flow of rivers (*Su. Sū.* XXXXV, 21).

V. Karma (action): *Karma* is defined as action which is inherent in matter as a cause of association and dissociation. It is further postulated that this action does not require any other ancillary in the process of causing separation from the previous state or position as well as of combination with the subsequent one except its being in proximity to the substratum. Action, in Ayurveda, has the distinct connotation of achievement or accomplishment. This term is used in different contexts with its meaning relevant to the context. It is significant to note that the term action is also used to mean *prajñāparādha* as a cause of several psychosomatic diseases. The same term is also used to mean treatment in general, while describing *pravṛtti* or to encompass specific therapies like emesis, purgation, medicated enema, and nasal insufflation. At the same time, action also refers to the past deeds of an individual on the one hand and, on the other, any type of exercise or any effort. Thus the word, action, in Ayurveda has a broad spectrum of meaning. It may, however, be noted that the commentators of the *Caraka saṃhitā*, from Chakrapāṇi to the scholars of the 20th century, have commented on the statement of Caraka, namely, *Karma nānyat apekṣate* (other *karmas* are not expected to fall under this definition of *karma*). Thus this statement conveys a message that action here means *action of a therapeutic drug or a food article*, which excludes any other action like emetic therapy as well as past deeds. It would appear that the exposition of *karma* of *Karma yoga* of Mīmāṃsā philosophy which was prevalent during the period of Agniveśa, was not regarded as having a direct bearing on the problems of health and hence they were probably excluded from the purview of *karma* in Ayurveda as a medical practice. But this approach does not appear to be sound because, according to Ayurveda, past deeds, exercises and actions of mind, body and speech do have their influence on health problems. The Vaiśeṣika philosophy also defines *karma* in a way which is almost identical to that of Ayurveda, so far as its main content is concerned. But the Ayurvedic view of *karma* stresses that action is performed to achieve a definite and desired effect, and excludes other effects like physically observed motion as described in Vaiśeṣika philosophy.

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Details of Karma in Ayurveda

Prayatnādi karma also called ceṣṭā (efforts): The Ayurvedic commentators, Gayadas and Ḍalhaṇa, opine that extension, flexion, bending (forward or backward), rising and moving laterally are all efforts or actions. *Vyāyāma* or exercise is also considered as an action which causes exertion to the body. All *yogāsanas* are in a way close to this type of action. As noted before, efforts of different kinds are a quality of living beings and have been mentioned under *guṇas* or properties also.

Pañca karma: The most important Ayurvedic *karma* is what is known as *pañca karma*, the five procedures having therapeutic action each of them is performed in 3 stages. Each stage is successively categorized as (i) *pūrvakarma* (pre-operative procedure); (ii) *pradhāna karma* (operative procedure); and (iii) *paścāt karma* (post-operative procedure)

Pre-operative procedure: According to Suśruta, the preparation of a patient, collection of herbs and minerals as well as the preparation of drugs required for a therapy on the one hand and, on the other, keeping ready the surgical instruments and associated equipment just before a major operative process is known as the pre-operative procedure.

Operative procedure: This relates to the actual conduct of emesis, purgation, enema or any other type of operation. *Post-operative procedure:* This is a prescription of the care and caution to be taken with regard to a patient's diet, dressing, dwelling place and other regimen to be followed by him, till he completely recovers after a major process of operative therapy (*Sū*.V.6-8). According to Caraka, the five *karmas* are: (i) emesis; (ii) purgation; (iii) enema with medicated or non-medicated oil as a major ingredient; (iv) enema with decoction as major ingredient; and (v) nasal insufflation (*Sū*.XXVI.10)

Dravya karma or action of a drug: The actions of a drug are manifold: carminative (*dīpana*); digestive (*pācana*); anti-inflammatory/ anti-phlogistic (*sotaghna*); diuretic (*mūtra virecana*); haemostatic or anti-diarrhoeal (*stambhana*); anodyne (*śūla praśamana*); anti-pyretic (*jvaraghna*); diaphoretic (*svedana*); rejuvenating (*rasāyana*); aphrodisiac (*vājīkaraṇa*); emmenagogue (*ārtavajanana*); and galactogogue (*stanyajanana*). Amazingly, hundreds of such actions have been described in Ayurveda along with explanations and examples of each of the above drug-action. These must have been arrived at by Ayurvedic sages after careful observation and experimentation, possibly by trial and error method.

Śastra karma or functions of surgical instruments: Cutting, incision, excision, suturing, disjointing, piercing, pressing, scraping and probing are among the examples of this category of action.

Prajñāparādha karma: This relates to an individual with regard to his physical, verbal and psychic actions or activities, which may be either desirable or undesirable. This is also related to their utilization, non-utilization or improper utilisation. These have been well delineated in the Ayurvedic classical texts and their commentaries. Even sinful acts come under the purview of this category.

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Past deeds: Ayurveda, as noted earlier, regards that the deeds, good or bad, performed in the past life of an individual, would not be futile, and every deed, great or small, is bound to yield its fruits proportionately and in accordance with its character. The fruits of past action may be enjoyed or suffered either in the same birth or in the next, if something remains yet to be experienced. It may be reiterated that Ayurveda accepts the law of *Karma* in its own way.

VI. Samavāya (Inherence): Inherence is the relationship between the substratum and its content; for example, the inseparable concomitance of matter, its qualities and actions, which can never be dissociated from one another. The concept of the whole (*avayavi)* and its parts (*avayavin*) can be understood only in terms of inherence. Further, although the material object is ephemeral, the inseparable concomitance existing between an object and its qualities or actions, is always eternal.

The foregoing conceptual aspects, it may be emphasized, have been adopted by Ayurveda in furtherance of its holistic medicine in an applied manner, without going into the details of their philosophical nuances as one notices in the Vaiśeṣika system in the context of what is eternal or non-eternal.

SĀṄKHYA PHILOSOPHY AND AYURVEDA

The Saṅkhya philosophy has been described briefly in Appendix VI. It is believed to be the most ancient of the Indian philosophical systems, which has evolved into its present form over many centuries. The founder of this system is stated to be the sage Kapila, although the seeds of Sāṅkhya are found in the Ṛgveda, some upaniṣads and the Mahābhārata. The great epic even goes to the extent of stating that whatever knowledge be, it has come from the Sāṅkhya source only, and that there is no knowledge parallel to Sāṅkhya. Interestingly, a quotation from the *Caraka saṃhitā* also gives almost a similar meaning. Caraka also opines that the Sāṅkhya knowledge is as much illuminating as the Sun is in the universe.

Guṇaratna, a commentator on *Śaḍdarśana samuccaya,* has pointed out that *Māṭhara bhāṣhya* and *Ātreya tantra* are the two authentic texts on Sāṅkhya philosophy. While nothing is known about the former text, the latter appears to have some significance so far as the *Caraka saṃhitā* is concerned, because the preceptor of the sage Agniveśa, the original author of *Caraka saṃhitā* was the sage, Atreya. Sāṅkhya of Agniveśa mentioned in the *Caraka saṃhitā,* and that of Bhela (another disciple of Ātreya) mentioned in the *Bhela samhita,* are one and the same. The Sāṅkhya described in these two texts, however, is at variance with the exposition found in the two major classical texts on Sāṅkhya, namely, the *Sāṅkhya pravacanasūtra*, and the *Sāṅkhyakārikā*, thus pointing to the fact that the Sāṅkhya philosophy of *Caraka saṃhitā* is older. It may, nevertheless, be noted that Caraka followed the 24 principles (*tattvas*) while Suśruta proceeds on the basis of 25 principles similar to Īśvara Kṛṣṇa whose *Sāṅkhyakārikā* is a basic text of the Sāṅkhya with the introduction of Supreme God as the prime principle. There are also certain followers of the Sāṅkhya of 26 principles.

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At the outset, in this respect , it should be explained that the term, *dhātu,* is used in the *Caraka saṃhitā* in the place of *tattvas* of the Sāṅkhya system. The Bauddha philosophy also appears to have taken the term, *dhātu,* from Ayurveda. Another fact to be observed is the conspicuous absence of the term, *tanmātra,* in the *Caraka saṃhitā;* while Īsvara Kṛṣṇa's *Sāṅkhya Kārikā* expounds them. According to Chakrapāṇi, the commentator of *Caraka saṃhitā*, the term, *sūkṣma bhūta* is used in the Ayurveda in the place of *tanmātra* which is acceptable under some circumstances. However, the Sāṅkhya term, *mūlāprakṛiti* as the first *tattva* in combination with *Puruṣa* as the root cause of evolution, has no place in the *Caraka saṃhitā*. It is replaced by the term, *avyakta* (unmanifest) which has a much wider connotation and which is used in the pre-classical Sāṅkhya. *Puruṣa, avyakta* and *Brahma* are synonyms according to the *Caraka Sāṅkhya* which, as stated earlier, is of 24 principles only. Further, according to *Caraka Sāṅkhya*, it is from the *Avyakta-Puruṣa* that the universe has evolved with *sattva, rajas* and *tamas* (*guṇas*) and other principles and the factors of evolution are broadly classified as *Prakṛti* and *Vikṛti*. The former includes the five elements, their subtle states, intellect, and *avyākta ahaṅkara* (ego). The latter stands for a group of five senses, five motor organs, mind and five objects of senses, totalling sixteen. This is different from the classical Sāṅkhya. Surprisingly, the term *Mahat*, the most familiar term in Sāṅkhya, has nowhere been used by Caraka; instead the term *Buddhi* is used.

Another speciality of *Caraka Sāṅkhya* is the rejection of the multiple soul theory and the assertion of the unisoul concept. It is evident by the fact that, among the questions which Agniveśa asked his preceptor (Ātreya) is the one which enquires about the way of recognizing the empirical soul which is omnipresent or devoid of all contacts, and which is only one and tranquil (*Sū*.I.14). In reply, Ātreya says that as soon as the final renunciation is attained, the pure consciousness together with its final causes in the form of indeterminate, determinate or scriptural knowledge, is completely eradicated and thereafter one would identify oneself with *Brahman*, the empirical soul ceasing to exist (*Sū*.I.155). Nevertheless, *ātmā* or *puruṣa* in Ayurveda is not devoid of properties, nor actions in all states, though it is accepted that *ātmā* is without qualities and action only in absolute state of dissolution or mokṣa (*Śā*.I.3).

According to Agniveśa (*Śā*. IV.8), the soul first of all unites with *ākāśa* before uniting with the other elements for setting forth the creation or the formation of the embryo. Thus *ākāsā* is created first and the attributes of the other bhūtas become more and more manifest successively (*Śā*.IV.8).This process is also comparable to the one found in the *Taittirīya upaniṣad* while the *Vaiśeṣika* systems does not accept this position and emphasises that *ākāśa* is eternal and uncreated. There are other differences between the *Caraka Sāṅkhya* and the classical *Sāṅkhya*. For example, Ayurveda considers even senses to be constituted of *pañcamahābhūtas,* while the *Sāṅkhya Kārikā* of Īśvara Kṛṣṇa explains that the sensory organs are the products of *ahaṅkāra* (ego).

The philosophical aspects of Ayurveda apart, the foetal development, origin of viscera, bones, hair, nails, teeth and others have been discussed in Ayurveda with reference to the soul. It is interesting to note that the *Puruṣa* as a foetus is also called *garbhātma* (foetal soul), *antarātma* (inner soul) and *jīva* (animated soul), soul being conceived as

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being eternal, unafflicted with diseases, without ageing and immortal, omnipotent, invisible, without beginning or end, and unchangeable. By entering into the uterus, soul unites with the sperm and ovum thereby reproducing itself in the form of a foetus. The state of mere existence of sperm and ovum, prior to their combination with the soul, cannot be called a foetus. The embryo, formed by the five elements, namely, *ākāśa* (ubiquitous substance), *vāyu* (air), *agni* (fire), *jala* (water) and *pṛthvī* (earth) serves as the receptacle of consciousness. In fact, the soul or the conscious element, constitutes the sixth *dhātu* responsible for the formation of embryo, according to Caraka.

This conscious element (soul) is regarded as the concomitant cause, non-constituent cause and efficient cause alike. It is also considered as the indestructible cause, the thinker, witness, knower, supporter, creator, and builder of the universe.

Macrocosm and Microcosm

The concept of macrocosm and microcosm is also a foundational one for Ayurveda, as Ātreya says that not only all the material and spiritual phenomena of the universe are present in the individual, but even all those present in the individual are in the universe. In other words, the individual is an epitome of the universe.

The commonality between the universe and the individual can be illustrated as follows as pointed out by Agniveśa.

Individual	*Universe*
Antarātamā	*Brahman*
Form	*Pṛthvī* (Earth)
Fluids	*Ap* (Water)
Temperature	Tejas (Fire)
Porous parts	*Ākāśa* (an ubiquitous one)
Ego	Indra
Anger	Rudra
Pleasure	Moon
Ignorance	Darkness
Knowledge	Light

This comparison is not without any purpose in medical science. In fact, the relevance of this had even been questioned by Agniveśa himself, in reply to which Ātreya says: "one who sees equally the entire universe in his own self as well as his own self in the entire universe, is in possession of true knowledge. Such a person experiencing the whole universe in his ownself believes that none but his own self is responsible for happiness and miseries. The individual self being subordinate to his own action indulges in various activities only when impelled by cause, etc. As soon as he realizes his identity with the entire universe, he is in possession of true knowledge which stands him in good stead in attaining salvation". Thus, by virtue of this realisation, one becomes absolutely free from attachment of all sorts and hatred of diverse nature which are the root causes of human miseries including ailments.

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Satkāryavāda (continuous causation)

Satkāryavāda or *pariṇāmavāda* in *Sāṅkhya*, is an epistemic major concept propounded in the *Sāṅkhya* system. According to this concept, the effect pre-exists in the cause or is the essence of cause. In other words, the effect is only an explicit manifestation or transformation (*pariṇāma*) and hence there is no *new* production. *Prakṛti*, the primordial or root cause of creation is an uncaused cause and gets transformed into many shapes, sizes and forms of the manifested or evolved universe as a result of the imbalance in the three guṇas (*sattva, rajas and tamas*) which are stated to be always present and active, and have the potential for transformation. Hence they are never stable even for a moment. Before the time of creation or at the time of dissolution they forsake their nature of ever getting transformed and remain in a state of equilibrium. The essence of this concept revolves round the following five postulates :

(i) If the effect is not to be in the cause itself, it cannot be produced by any effort, as it is not possible to extract oil from sand or butter from sky;
(ii) Every effect is caused by a specific cause, as curd is formed from only milk and not by any other means;
(iii) Only a powerful cause can produce a desired effect;
(iv) If the effect is not present in the cause, it has to be accepted that the existent comes from a non-existent, i.e. something can be produced from nothing which can never be a fact; and
(v) The effect is not different from the cause; it is the unmanifested and manifested stage of one and the same thing.

It should be recognized that in Ayurveda the cause and effect relationship is the only theory that has a wide range of application, be it a state of balanced health and happiness, a disease, a drug action or any other aspect of life. Caraka rightly says that a seed cannot come into existence without a seed or there cannot be any result for which there is no action (*Sū*.XI.32). A particular type of plant cannot be produced by a seed belonging to another species. A seed of human being (human sperm and ovum) can produce only human being and not an animal like horse or cow (Śā.III.16)

As a medical science, Ayurveda has used these postulates. But the exposition of the Sāṅkhya system that the cause gets transformed into the effect or the effect is only the manifested stage of the unmanifested cause, finds rather a limited application in Ayurveda like the unmanifested soul becoming manifest in the embryo.

The word, *pariṇāma,* which means evolution or transformation, is used in Ayurveda in specific contexts where a process of transformation is a characteristic feature and needs to be known as such; for example, time is regarded as a synonym of *pariṇāma* and has been considered to be a cause of diseases. The transformation of food into bodily elements, and a disease in which there is abdominal pain during the process of the transformation of food are the other examples. Significantly, the factors which influence the transformation of food are called the *āhāra pariṇāmakara bhāvas.*

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Three Types of Miseries

Ayurveda, concerned as it is with the removal of miseries, both physical and mental, has approached the problem of misery in its own manner but in the framework of *Sāṅkhya*, in terms of *ādhibhautika, ādhyātmika* and *ādhidaivika*. Suśruta has meaningfully classified the diseases under these three categories and explained their characteristics. A close examination of this approach would not fail to reveal its importance in going deep into the origin of a disease in an individual and in determining appropriate therapy for its cure (Su.*Sū*.XXIV.2.4,9)

YOGA PHILOSOPHY AND AYURVEDA

Ayurveda speaks of the yoga system to a lesser degree than *Sāṅkhya*, *Vaiśeṣika* or *Nyāya* systems. Sage Patañjali in whose name the *Yogasūtra* stands was not the original founder of the *Yoga* system. According to the *Mahābhārata* (*Śānti parva,* 349.65), Hiraṇyagarbha who lived prior to Patañjali was considered as the real father of this system which is invariably associated with *Sāṅkhya*, according to the commentator, Jayamaṅgala. The available *Yogasūtras* are also in a way called the *Sāṅkhya-pravacana.*

In Ayurveda, the term Yoga is commonly used for medicinal preparations such as *taila yoga, cūrṇa yoga, guṭi yoga.* In this context, yoga means only a combination of more than one medicine. In other words, the etymological meaning of the term, *yoga,* (to unite) is mostly employed in Ayurveda, but not in the sense of the *Yoga* system where it means that a Yogic practitioner can attain unity or oneness with the Absolute. According to Caraka, *yoga* also means the proper application of any therapy obviously in a biophysical manner. Although the maintenance of health and the removal of mental and physical disorders are the main concerns of Ayurveda, the ultimate purpose of achieving perfect health is also aimed at emancipation or liberation from the agonies of the material world. Patañjali in his *Yoga sūtra* has regarded disease as one of the miserable disorders and advises one to abandon the miseries of all sorts. It may be pointed out that in the Yoga system, *japa* (incantation in a state of meditation) is advocated as a means for purifying the sensory organs. This corresponds to what is known as the *sattvāvajaya cikitsā* narrated in Ayurveda. The proper line of treatment for mental disorders, as given in the *Caraka saṃhitā* (*Sū*.I.50), is to take recourse to spiritual and scriptural knowledge, tolerance, memory, and meditation (*samādhi*). The state of *samādhi* used in this context is also one of the major components of Yoga philosophy.

The sage Ātreya, while answering a query as to where exactly the miseries remain and how they can be totally eliminated, states that there are two types of contacts—the mental and the sensory—which bring about either happiness or misery and desires in the form of likes and dislikes. To be totally relieved from these, *yoga* is a ladder, a means to attain emancipation from miseries(*Śā*.I.37). According to Ātreya, *yoga* is a condition where the mind is concentrated and contained in the soul leading to the attainment of full control over the mind and body. He admits that this is the science of *yoga*, as dictated by the sages of *yoga* and not by himself. It can thus be construed that Ayurveda gives due recognition to *yoga*, its contemporary spiritual tradition.

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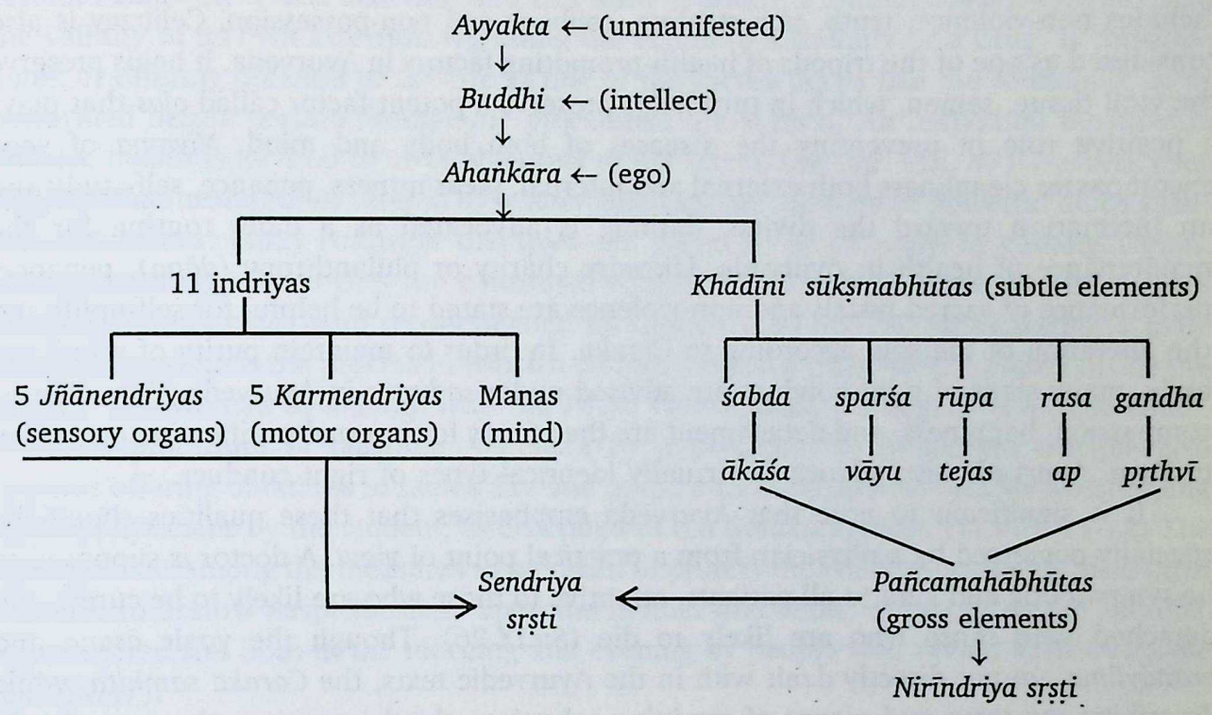
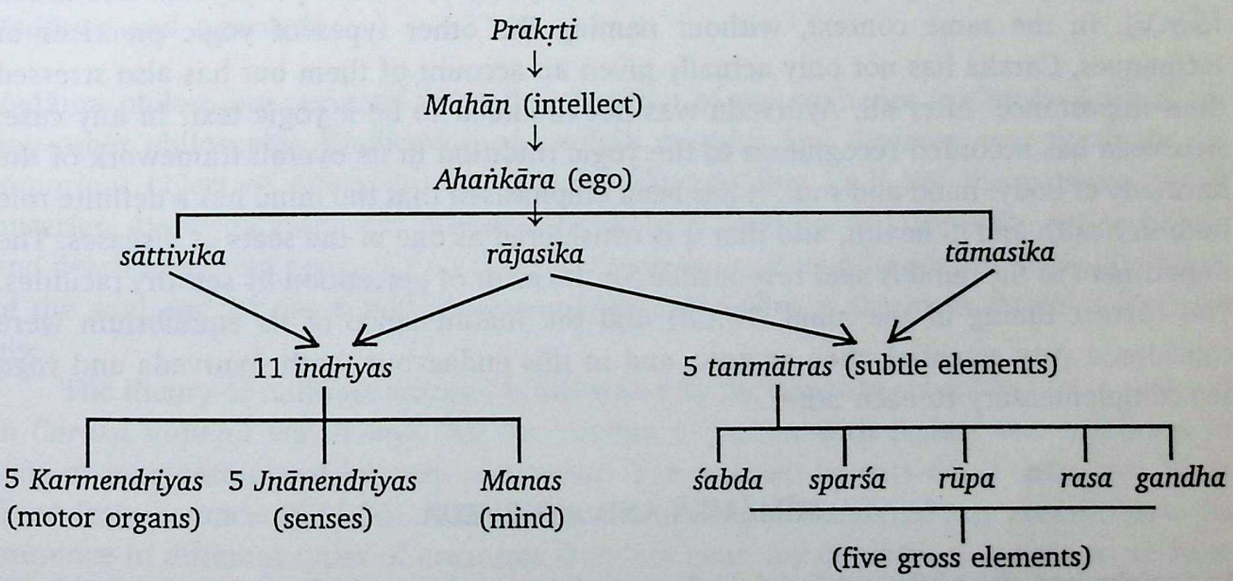
SĀṄKHYA PHILOSOPHY AND AYURVEDA

I. Original (ādya) Sāṅkhya as found in *Agniveśa tantra (Caraka saṃhitā)*



II. Sāṅkhya as found in the *Suśruta Saṃhitā*



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To attain purity of mind (*cittaśuddhi*) which is necessary for the purpose of discarding desires, *Yoga* prescribes eight practices: (i) *yama;* (ii) *niyama;* (iii) *āsana;* (iv) *prāṇāyāma;* (v) pratyāhāra; (vi) *dhāraṇā;* (vii) *dhyāna;* and (viii) *samādhi,* as instruments. *Yama* includes non-violence, truth, non-stealing, celibacy and non-possession. Celibacy is also considered as one of the tripods of health-promoting factors in Ayurveda. It helps preserve the vital tissue, semen, which in turn helps preserve a potent factor called *ojas* that plays a positive role in preventing the diseases of both body and mind. *Niyama* of *yoga* encompasses cleanliness both external and internal, pleasantness, penance, self-study and an inclination toward the divine. Bathing is advocated as a daily routine for the maintenance of health in Ayurveda. Likewise charity or philanthropy (*dāna*), penance, performance of sacred rituals and non-violence are stated to be helpful for self-uplift and the liberation of the soul according to Caraka. In order to maintain purity of mind and body, many steps of right conduct are advised under *sadvṛtta* in Ayurveda. Friendliness, compassion, happiness, and detachment are the means for internal purification according to *Yoga*. Ayurveda also advocates virtually identical types of right conduct.

It is significant to note that Ayurveda emphasises that these qualities should be specially possessed by a physician from a practical point of view. A doctor is supposed to be sympathetic and kind to all patients, attentive to those who are likely to be cured, and detached with those who are likely to die (*Sū*.IX.26). Though the yogic *āsana* and *prāṇāyāma* are not directly dealt with in the Ayurvedic texts, the *Caraka saṃhitā,* while describing the ways and means of attaining salvation, clearly mentions that one should have confidence in yogic practices which naturally would include *prāṇāyāma* and *āsana* (*Śār*.V). In the same context, without naming the other types of yogic practices or techniques, Caraka has not only actually given an account of them but has also stressed their importance. After all, Ayurveda was not intended to be a yogic text. In any case, Ayurveda has accorded recognition to the yogic tradition in its overall framework of the harmony of body, mind and soul. It has been emphasised that the mind has a definite role both in health and ill health, and that it is considered as one of the seats of diseases. The impairment of the mind is held responsible for the error of perception by sensory faculties. The correct tuning of the mind (*Ni*.I.3) and the maintenance of its equilibrium were considered very essential, then as now, and in this endeavour, both Ayurveda and *yoga* are complementary to each other.

MĪMĀṂSĀ AND AYURVEDA

An insight into the philosophical foundation of Ayurveda would be incomplete without some reference to the *Mīmāṃsā* system *vis-a-vis* Ayurveda, although the foundational ideas of Ayurveda are, to a great extent, intertwined with those of the *Sāṅkhya*, *Vaiśeṣika* and the *Nyāya* system. There are several examples which authenticate that Ayurveda has not ignored the *Mīmāṃsā* system, though the name of Mīmāṃsā philosophy is not acknowledged anywhere in Ayurveda *saṃhitās*, unlike Sāṃkhya-Yoga which are alluded to and discussed in some detail.

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The term, *Mīmāṃsā,* is derived from the root, *man* (to think or to discuss). It is therefore defined as logical thinking. But the *Mīmāṃsā* system is also concerned with certain rituals. Ayurveda also has used this term in almost a similar sense while stressing the validity of its own assertion regarding the action of a therapy or a drug. It considers *homa* or offering oblation to the fire as one of the sacred deeds like the Mīmāṃsā, to be performed before certain therapeutic procedures are started. An individual desirous of positive health is advised to offer oblations to the sacred fire (*Sū*. VIII. 47). Suśruta even suggests that incantations uttered by a venerable sage are often more powerful detoxicants than medicines. Many *rasāyana* therapies are stated to be effective in gaining vigour, vitality and longevity, if they are consumed with certain rituals. Specific rites on days of auspicious stars have been recommended by Caraka (*Sū*.XXIX.10) for begetting a male child. *Puṃsavana* is the process in which a certain medicine plant juice is placed inside the nostrils of a woman coinciding with the *Puṣya* constellation for begetting a male child.

The procedure of teaching Ayurveda by a preceptor to a selected disciple also involves offering oblations to sacred fire and auspicious incantations, besides worshipping elderly physicians by the student, as described in the *Caraka saṃhitā* (*Vi*.VIII. 11-12) The text says that among the measures to be taken to protect the child immediately after birth and also to bestow auspiciousness upon the mother and child, is the offering of sacrifice to the sacred fire both in the morning and evening by people well versed in *Atharvaveda* (*Śā*.VIII.47).

Vedānta and Ayurveda

Vedānta philosophy occupies as much a position of pre-eminence in *Caraka saṃhitā* as any other philosophy. Eradication of worldly miseries and diseases, was no doubt an important object of Ayurveda, but it never claimed that in it lies the panacea to all miseries. Ayurveda knew that miseries are likely to continue as long as the cycle of birth and death exists and believed that the solution to the endless miseries lies in the liberation of the soul and its union with *Brahman* (Absolute). This is the main thrust of *Vedānta* also.

The theory of multiple *puruṣas* as advanced by the Sāṅkhya school has been rejected in *Caraka saṃhitā* which says that the contact of *puruṣa* with *Buddhi* etc. continues so long as he is influenced by *rajas* and *tamas*. The moment he gets rid of these two, he is freed from contacts (*Śā*.I.36). 'The absolute soul does not undergo any modification. Its presence in different types of creatures does not bear any distinction. It appears to have distinctions only on account of the specific features of the body and mind of different types of creatures (*Śā*.IV.33). Even though it is located in one body, it is still present in all bodies. But its field of action is limited to one body alone because of its contact with the mind.

Vedānta does not accept the prevalence of a separate mūlā *prakṛti* as the primordial cause, which is the premise of Sāṅkhya. Caraka also does not accept *mūlā prakṛti* as a separate *tattva*, but accepts *Avyakta* which itself is *Brahman* or *Kṣetrajña* as the primordial cause of the universe. (*Śā*.I.61; III.25)

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Relinquishment of worldly enjoyment is *vairāgya*. Worldly enjoyments are technically called *tṛṣṇa*, the synonym of which is *upādha* in *Caraka saṃhitā*,. Happiness and misery bring about *tṛṣṇa* in the form of likes and dislikes respectively. It is this *tṛṣṇa* that in turn gathers factors which serve as the substratum for happiness and misery. Such accumulated factors are responsible for the contact of body and mind and in the absence of this contact there can be no happiness or misery (*Śā*.I.135).

According to *Vedānta*, *vairāgya* is a state of mind with a deep sense of detachment and equanimity between the body and the cosmos with an experience of oneness with *Brahman*. Caraka's standpoint is similar to this *Vedāntic* exposition.

Knowledge of reality (*satya buddhi*) is the only means of attaining salvation. This is also called the *tattvasmṛti* by Caraka (*Śā*.I.150). It is stated that persons following this path do not come back to worldly traps. Becoming one with *Brahman* is also called *yoga* (*Śā*.I.151). *Caraka sāṃhitā* has described the ways and means of attaining salvation, including yogic practices, religious rituals, daily routines, ethical codes, etc., (*Śā*.V.12) which are akin to the life-style prescribed for a mendicant (*sanyāsi*) in some Hindu texts. In the 5th Chapter of *Śarīra* of *Caraka Saṃhitā*, the causes of attachment (*pravṛtti*) have been defined and enumerated, negating the then prevalent improper means like fasting, consecration, offering oblation to fire, and performance of other rituals. Agniveśa has stated that to attain salvation or to become one with *Brahman*, the path of knowledge (*jñāna mārga*) is the best.

PAÑCABHŪTA CONCEPT

In the Sāṅkhya and the Vaiśeṣika systems, as noted earlier, the postulate of five elements—*pṛthvī* (earth, *ap* (water), *tejas* (fire, *vāyu* (air) and *ākāśa* (a ubiquitous element) has a distinct place. Known as the *pañcamahābhūtas*, they are an integral part of these systems, encompassing not only the knowable physical world but also the gross human body. Ayurveda's two fold objective of promoting health and the cure of diseases could only be achieved by knowing the physical structure as well as the functional aspects of living beings. It is indeed inadequate to know that the human body is only a blend of several organs, vital forces, tissues, fluids, vessels, excreta, and the like, or that a plant is constituted of leaves, bark, stem, root, flowers, fruits, and seeds. Ayurveda throws light on the intrinsic constituents universally found both in the living and the non-living. In this respect, the five elements (*pañcabhūtas*) play a major role in various ways.

Foetal development: Suśruta has explained the normal foetal development in relation to the part played by the five elements even in the embryonic stage. Caraka states that the embryo is formed by the five elements and serves as the receptacle of consciousness. While describing the union of *ātma* with the zygote, Agniveśa says that the former, desirous of creating another body, first of all unites with *ākāśa* and then with other elements with their attributes manifesting themselves in successive stages. He also explains how the elements nourish and enrich the embryo. According to him, the elements from the outside world enter the zygote through the father's sperm and mother's ovum. This

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means that the sperm and ovum are also made of the five elements and, in turn, they enrich the five elements of the embryo that has been formed internally with the soul. Further, this combination is nourished by the essence of food which, according to Ayurveda, is also composed of five elements. As noted before, the elements accompanying the soul while in the mother's womb are not the gross ones (*mahābhūtas)*, but their subtle stages (*tanmātra)* of what are called the *sūkṣma bhūtas*, the invariable components of *sūkṣma śarīra* (microcosmic body).

It has been explained that the colour of the skin of the foetus develops due to the varied combinations of the five elements, *tejas* (fire element) playing a dominant role in the colour formation. The elemental composition of colour is as follows according to Susruta: (i) white complexion—(*tejas* + *ap*); (ii) dark complexion—(*tejas* + *pṛthvi*); (iii) brown complexion (*tejas* + *pṛthvī* + *ākāśa*); (iv) a mixed complexion (*tejas* + *ap* + *ākāśa*). Caraka has a different view. According to him, the colour formation is : (i) white (*tejas* + *ap* + *ākāśa*); (ii) dark (*tejas* + *prthvi* + *vāyu*); and (iii) *bluish* (all the elements in equal proportion)

Body parts and five elements: Based on the predominance of an element in the formation of a particular body part or organ, Ayurveda has classified the body parts into *pārthiva* (of earth element); *āpya* (of water); *āgneya* (of fire), *vāyavīya* (of air) and *ākāśīya* (the fifth ubiquitous element). The following classification gives more details in this respect:

Predominance of element		***Body parts or organs***
Composition	*Properties*	*Functions*
(i) *Pārthiva*	gross, stable, heavy, rough, hard, etc.,	nails, bones, teeth, muscles, skin, stools, hair, beard, moustache, ligaments, nose and smell.
(ii) *Āpya*	fluid, dull, slimy, soft, unctuous, cold, etc.,	lymph, blood, fat, phlegm, bile juice, urine, sweat tongue and taste.
(iii) *Āgneya*	hot, sharp, subtle light, dry, clear, etc.,	complexion, temperature, and eyes; digestion and metabolism; colour.
(iv) *Vāyavīya*	light, cold, dry, brittle, clear, subtle, etc.	respiratory, blinking of eyes and all actions like flexion, extension, rotation, etc; skin, circulation, pulsation and tactile.
(v) *Ākāśīya*	soft, light, subtle, smooth, etc.	intercellular space or any space in the body like in vessels, joints, tissues, ears and hearing.

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All the tissues and excreta are regarded as being composed of five elements. Yet on the basis of the predominance of an element in the composition of a particular tissue or excreta, there is another classification as shown below:

Body elements/factors	*Predominance of element*
(i) *Vāta*	*Vāyu*
(ii) *Pitta*	
Ārtava (menstrual blood)	*Agni*
Intellect	
(iii) *Kapha, rasa, majjā, semen,* sweat, breast milk, *ojas,*	*Ap*
(iv) Muscles, faeces	*Pṛthvī*
(v) *Rakta*	*Agni + Ap*
(vi) *Urine*	*Ap + Agni*
(vii) *Fat*	*Pṛthvī + Ap*
(viii) *Bones*	*Pṛthvī + Vāyu*

Tridoṣas (bio-energies) and the five elements: *Vāta, pitta* and *kapha,* the three vitiating principles (*doṣas*), are stated to be basically composed of the five elements. *Vāta* is predominantly of *vāyu* and *ākāśa*; *pitta,* of *tejas*; and *kapha,* of *ap* and *pṛthvī*. This apart, Suśruta speaks of another aspect concerning the relationship between the *doṣas* and the five elements which is practically useful in determining treatment, as follows:

Vitiating element (normal *doṣas*)	*Alleviating elements*	*Aggravating elements*
Vāta	*Pṛthvī* or *tejas* drugs	*Ākāśa* and *vāyavīya* drugs
Pitta	*Pṛthvī, vāyavīya* or *āpya* substances	*Tejas* substances
Kapha	Ākāśa, *tejas* or *vāyavīya* drugs	*Pṛthvī* and *āpya* substances

Digestion and metabolism: Digeṣtion and metabolism are among the main physiological processes by which food materials are transformed into bodily constituents through the mediation of what is technically called the *agni*. The role of *agni* in this transformation has been extensively elucidated in Ayurveda. Predominantly of the element *tejas,* (fire) *agni* is stated to be of 13 types: (i) *jaṭharāgni*; (ii) five *bhūtāgnis*; and (iii) seven *dhātvagnis*. *Jaṭharāgni* is the one which is situated in the alimentary tract; *dhātvagnis* are those which are located in the respective *srotās* of different tissues; and *bhūtāgni* corresponds to the five elements. It should be emphasized that the role of respective *agnis* is to digest such portions of the food as would belong to *pṛthvī* and the other elements. Thus, the *pārthiva* components of the food consumed is digested by *pārthivāgni* and helps them to be assimilated into the *pārthiva* bodily elements and so on. Further, the *pārthiva* component of the food nourishes the *pārthiva* element of the body and the other components of other elements will similarly nourish the related elemental components of the body.

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The food materials and drugs (both animate and inanimate) are also, according to Ayurveda, composed of the five elements, which means that all the products (gross and subtle) are also constituted of these elements. Ayurveda has even explained the mechanism of the formation of a substance by sequential combination of the five elements. Thus, the *pṛthvī* element serves as a substratum in which the atoms of *ap* element act as a cohesive or adhesive agent, and this combination undergoes a process of chemical transformation because of *agni* (*pākakriyā*). The role of the *vāyu* element in this situation is to cause a vibration (attraction-repulsion) of atoms of *pṛthvī* and the *ap* elements leading to a particular configuration of subtle states. The *ākāśa* element plays the role of providing space for motion between atoms and also space for the disposition of atoms of *pṛthvī* element, etc. Even the whole process of formation of a drug is attributed to some special characters of mutual contact, (*parasparopasaṃsarga*), mutual cooperation (*parasparānugraha*) and mutual interaction (*parasparānu praveśa*) among the subtle states (*tanmātras*)of the five elements.

The five bhūtas stand for a classification of substances on the basis of their generic properties resulting from the structural type of their constituent atoms—a classification more physical than chemical or chemico- physical, unlike the purely chemical classification of the so called elements of modern chemistry.

***Six tastes and five elements*:** The Ayurvedic concept of the taste of a drug is indeed unique and is an important aspect of its pharmacology. It explains the action of a drug or a food article in a particular manner. It also helps to identify a drug on the basis of its taste. The elemental composition of a drug can also be identified by inference according to its taste which can be directly perceived by tongue. It assists too in deciding its utility or otherwise in a given disease depending on the increase or decrease of the strength or potency of corresponding elements. The Ayurvedic classics have clearly stated the composition of the six tastes (*rasas*) as follows : (i) Sweet (*pṛthvī* + *ap*); (ii) Sour (*pṛthvī* + *tejas*); (iii) Salt (*ap* + *tejas*); (iv) Bitter (*akāśa* + *vāyu*); (v) Pungent (*tejas* + *vāyu*); and (vi) Astringent (*pṛthvī* + *vāyu*);

Thus in Ayurveda, the theory of *pañcamahābhūtas* is not merely a philosophic or metaphysical one but also a physical postulate aimed at understanding and explaining the basic structural components of the body, bodily elements, food, drugs and their path of pharmacological action, based on the predominance of one or the other elements. In the Ayurvedic thought-structure, the five elemental postulate is next in importance only to the theory of *tridoṣas*.

In the end it may be emphasized that Ayurveda has now emerged as one of the most viable and efficacious traditional systems of medicine in the world. It has attracted the attention of the West where it has begun to take its place even amidst modern medicine, because of its foundational ideas which have remained practically unchanged over a long span of time. Its noble and humanitarian goal, as expressed in the *Caraka saṃhitā*, continues to be a source of inspiration for Ayurvedic practitioners.

Nātmārthaṃ nāpi kāmārthaṃ atha bhūtadayāṃ prati.
Vartate yaścikitsāyāṃ sa sarvamativartate.
Kurvate ye tu vṛttyarthaṃ cikitsāpaṇyavikrayaṃ.
Te hitvā kāñcanam rāśiṃ pāṃsurāśimupāsate.

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"Not for self, not for the fulfilment of any earthly desire or gain, but solely for the good of suffering, should you treat your patients and so excel all. Those who sell the treatment of diseases as merchandise gather dust and neglect gold".

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ABBREVIATIONS

CS: Caraka saṃhitā; Sū: Sūtrasthāna; Utt: Uttaratantra;
SS: Suśruta saṃhitā; CI: Cikitsā sthāna; Ka: Kalpa; VI: Vimāna sthāna; Ni: Nidāna;

APPENDIX I.

Ayurveda

- Related to human beings
  1. *Kāya cikitsā* (General medicine)
  2. *Bāla cikitsā* (Paediatrics,
  3. *Graha cikitsā* (Demonology and Psychiatry)
  4. *Ūrdhvāṅga cikitsā* (E.N.T. & Ophthalmology)
  5. *Śalya cikitsā* (Surgery)
  6. *Viṣa cikitsā* (Toxicology)
  7. *Jarā cikitsā* (Rejuvenation)
  8. *Vṛṣa cikitsā* (Sexology and andrology)
- Pertaining to plants
  - *Vṛkṣāyurveda*
- Pertaining to animals
  - *Hastyāyurveda* (related to elephants)
  - *Aśvāyurveda* (related to horses)
  - *Gavāyurveda* (related to bovine animals)

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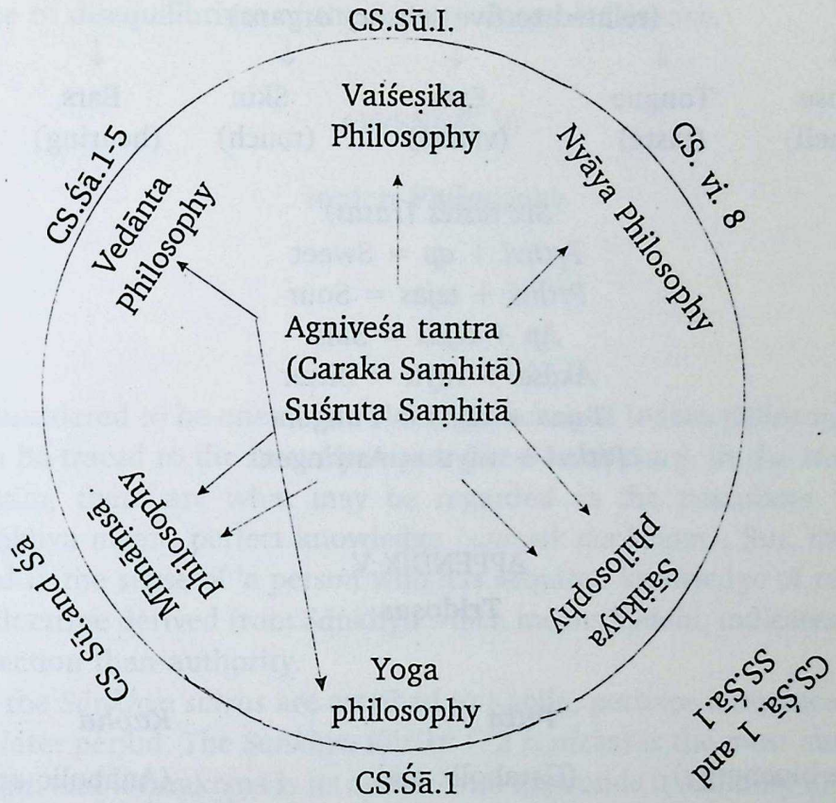
APPENDIX II.
Philosophy And Ayurveda

Philosophy in Ayurveda is not reductionistic, but unified and holistic in approach



This diagram shows the relevant chapters in CS and SS where the major aspects of respective philosophy can be found.

APPENDIX III.
Pharmacy

A. Fresh juice (*svarasa*); Powder (*cūrṇa*); Paste (*kalka*); Decoction (*kvātha*)

B. Medicated oils *taila*	Medicated ghee *ghṛta*	Self- generated alcoholic	Linctuses *lehyas*	Anointment *lepa*

Herbo-Mineral Preparations

C. Pills (*vaṭi*)	Ash (*bhasmas*)	*Kūpipakva rasāyanas*	*Kajjalī*

"If the Physicians of the present day would drop from the pharmacopia, all the modern drugs and chemicals and treat their patients according to the method of Caraka (a great Hindu physician), there would be less work for the undertakers and fewer chronic individuals in the world." **A.Weber**

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APPENDIX IV

Pañcamahābhūtas and sense organs

Pṛthvī	*Ap*	*Tejas*	*Vāyu*	*Ākāśa*
(related to five sensory organs)				
Nose (smell)	Tongue (taste)	Eyes (vision)	Skin (touch)	Ears (hearing)

Six tastes (rasas)

Pṛthvī + *ap* = Sweet
Pṛthvī + *tejas* = Sour
Ap + *tejas* = Salt
Ākāśa + *vāyu* = Bitter
Tejas + *vāyu* = Pungent
Pṛthvī + *vāyu* = Astringent

APPENDIX V

Tridoṣas

Vāta	***Pitta***	***Kapha***
(Regulative-bioenergy)	(Catabolic and thermogenic-bioenergy)	(Anabolic and thermotaxic-bioenergy)
Functions factors responsible for motor activities, and sense perceptions, respiration, circulation, Excretion mental activities, movements, etc.	*Functions* processes of digestion, tissue metabolism, colouration, body temperature, vision.	*Functions* moistening and structural support, nourishing

- Each is independently responsible for diseases
- Each is responsible for natural body constitutions.
- Each has its own role in the development of foetus.
- Each has some waste products and byproducts.
- Each has close physiological relations with some specific tissues as follows:
- Each is responsible for certain diseases; for example:

Doṣa	*Diseases*
Vāta	*pakṣaghāta* (paralysis), hemipiegia, arthritis (sandhivāta) *Ardita* (facial paralysis), gṛdhrasi (sciatica) etc.

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Pitta	*Āmlapitta* (hyperacidity), *paraiṇāmaśūla* (duodenal ulcer);
Kapha	*Sota* (anasarca), *jalodara* (ascities), *prameha* (diabetes).

Vāta—bones; *Pitta*—blood; *Kapha*—lymph and muscles
The state of equilibrium of these three **doṣas** is **Health.**
The state of disequilibrium of these three **doṣas** is **Disease.**

APPENDIX VI.

Indian Philosophy

Sāṅkhya

Sāṅkhya is considered to be one of the oldest branches of Indian philosophy. Some of its doctrines can be traced to the later *Upaniṣads* like *Svetaśvatara*. In the *Mahābhārata* and the *Bhagvadgīta,* there are what may be regarded as the postulates of pre-classical Sāṅkhya. Sāṅkhya means perfect knowledge (*samyak darśanam)*. But, the *Bhagavadgīta* uses the word in the sense of 'a person who has acquired knowledge of reality'. The very name of the doctrine derived from Sāṅkhya which means *buddhi*, indicates that it is based more on reflection than authority.

Though the *Sāṅkhya sūtras* are ascribed to Kapila, perhaps a mythical sage, they are said to be of later period. The *Sāṅkhya Kārikā* (72 stanzas) is the most authentic work on Sāṅkhya system and Īśvarakṛṣṇa is its author who expounds it avoiding discussions on the opponent's views (stanzas 72). Vācaspati Miśra is one of the great commentators on *Sāṅkhya Kārikā.*

The doctrine of Sāṅkhya is primarily dualistic (*Puruṣa* and *Prakṛti)*, but, the plurality of *puruṣas* (or selves) has made it pluralistic also. The main theme of Sāṅkhyan teaching is to delineate a clear distinction between matter and spirit. Puruṣa is pure and changeless. *Prakṛti* is one and ever changing. The latter in its involved state has an equipoise or equilibrium (*samyavastha*) of its three constituents or the three *guṇas*, namely, *sattva, rajas* and *tamas* (SK-13). *Guṇa* also means rope and these *guṇas* are intertwined as constituents of *Prakṛti* like the strands of rope. Hence they pervade everything from intellect to every object of perception. These *guṇas* represent bright and light (*sattva),* mobile and stimulating (*rajas),* and heavy and obstructing manifestation (*tamas)* in every object of perception.

It should be noted that *Prakṛti* and *Puruṣa* are complementary to each other in the sense that *Prakṛti*, the insentient matter and *Puruṣa* which is pure consciousness keep together like blind and the lame complementing together.

Prakṛti is subtle and mysterious which evolves and dissolves in a cyclic order. As a subtle being it gives rise to subtle products as intellect and mind. The first evolute of *Prakṛti* is *mahat* or *buddhi.* The intellect, ego (ahaṅkāra) and mind (manas) are the psychic aspects of its evolution. The other evolutions are, five sense organs (*jñanendriyas),*

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five organs of actions (*karmendriyas),* the five subtle entities (*tanmātras)*, and the five gross elements (*mahābhūtas)*- in all 24 principles.

Sāṅkhya system presents *Satkāryavāda* or *Pariṇāmavāda* and holds that the effect pre-exists in the cause. For instance, a jar is just a transformation of clay and, therefore, it is not a new product. Viśiṣṭādvaita and Śaivasiddhāntas also believe in this theory that the cause exists implicitly and the effect manifests itself after production. The unaffected *Puruṣa* is reflected in the *buddhi,* while *puruṣa* identifies himself with the acts of *Prakrti* through ego. The main purpose of *Prakṛti* is to subserve *puruṣa*. But it is the identification of *Puruṣa* in the acts of *Prakṛti*, psychical or physical, that is the cause of all miseries. *Puruṣa, per se,* has no birth or death and has no sense organs.

Though Sāṅkhya by and large is atheistic, it believes in the three proofs of knowledge (*pramāṇas*) viz. perception (*pratyakṣa*) inference (*anumāna*) and verbal testimony (*aptopadeśa*).

Its philosophical postulates have influenced the foundational ideas of Ayurveda and its psycho-somatic concepts.

Nyāya Darśana

The *Nyāya* philosophy deals with the correct methods of philosophical, but logical inquiry into the objects of any knowledge. It is defined as *'Pramānair artha parīkṣaṇam* i.e. 'it is a critical examination of the objects of knowledge by means of canons of logical proof'; (*Nyāya-bhāṣya*). The purpose of *Nyāya* is to accomplish the highest goal of life, i.e., salvation *(mokṣa).* It considers that salvation can be achieved by realizing the four aspects, namely, (i) the cause of pain; (ii) method of destruction of pain (knowledge); (iii) means of such destruction (treatise); and (iv) the goal to be attained. Further, it considers that the goal can only be accomplished by a thorough examination of the modes and sources of correct or valid knowledge. *Nyāya* examines the accepted standard philosophical concepts and fundamental problems of reality. To discover truth or reality, it envisages the following categories to be thoroughly studied and adopted: They are (i) means of right knowledge (*pramāṇa)*; (ii) objects of knowledge (*prameya*); (iii) doubt (*samśaya)*; (iv) purpose *(prayojana)*; (v) example (*dṛṣṭānta*); (vi) established tenet (*siddhānta)*; (vii) constituent propositions of a syllogism *(avayava);* (viii) confutation (*tarka);* (ix) ascertainment (*nirṇaya)*; (x) discussion (*vāda)*; (xi) wrangling (*jalpa);* (xii) cavil (*vitaṇḍa);* (xiii) fallacy *(hetvābhāsa)*; (xiv) equivocation (*chala)*; (xv) futility (*jāti)*; and (xvi) disagreement in principle (*nigraha sthāna*).

Means of Right Knowledge: *Direct perception, logical inference, comparison (upamāna) and verbal testimony (sabda) are the pramāṇas in* Nyāya *philosophy, through which true knowledge could be obtained. The Nyaya texts have given a detailed description of these means.*

Vaiśeṣika

Vaiśeṣika is a realistic school of Indian Philosophy propounded by the sage Kanāda. It acquired the name of Vaiśeṣika as it lays stress on particularity (*viśeṣa*) of the eternal

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substances, viz. the atoms of the four elements, (earth, water, fire and air) and the ubiquitous space and time. It believes in the plurality of souls. The mind is regarded as corporeal.

Vaiśeṣika enumerates six categories (the nameable and the knowable) which are ontological. They are: Substance (*dravya*), Quality (*guṇa*), Action (Karma), Generality (*sāmānya*); Particularity (viśeṣa) and Inherence (*samavāya*).

A substance exists through a relation of being -hood (*sattā*). Quality and action which are not self-existent are related to substance by means of inherence. In the atomic form, the first four elements, *pṛthvi*, *ap*, *tejas* and *vāyu* are eternal, and non-eternal in their composite forms. Being an object of cognition, the substance with quality and action is cognised by two means of knowledge, viz., perception and inference. The substances which are eternal viz. *ākāśa*, space, time, mind and soul are self-existent and indivisible. But mind is also considered as being atomic. Non-eternal substances are products of causal elements and have cause- effect relations. The doctrine of *asatkāryavāda* of *Vaiśeṣika* postulates that the cause and effect are separate and the effect is non-existent before production. But the cause inheres in the effect. The sense organs of smell, taste, vision, touch and sound are associated with earth, water, fire, air and *ākāśa* respectively.

According to Praśastapāda, an early exponent of the Vaiśeṣika, qualities are twenty four in number. Action is of five kinds and they inhere in a substance. Action brings about conjunction and disjunction among substances.

Sāmānya or generality and Viśeṣa or particularity, are known through intellect only. Particularity is the ultimate distinguishing feature, while generality inheres all individual objects. Inherence is basically a relation between two inseparable entities. Abhāva or non–existence was included as a category by the syncretic school of Nyāya-Vaiśeṣika later.

Vaiśeṣika is noted for its atomic theory, according to which atom is spherical and an ultimate indivisible part of an element A single atom is non-productive and hence composite substances are produced from dyad (two atoms) and onwards. The structural arrangement of the atoms is regarded as being responsible for the observed difference in qualities.

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CHAPTER 3

The Concept of Śarīra (Human Body)

I.P. Singh

ŚARĪRA IN AYURVEDA

Etymologically the word, *śarīra*, connotes a body, both animate and inanimate. It also means with reference to a human or animal body, and a biological entity wherein the anabolic and catabolic processes are continuously taking place, and which is subject to decay and death. In Ayurveda the term, *śarīra* (body), has not only been defined as the seat of our entire physical, mental and spiritual activities, but it has also been rightly regarded as an abode of senses (motor and sensory), mind and spirit (consciousness), and the basis of all our entire range of pleasures and pains. The body is regarded as having been composed of *pañca mahābhūtas* (physical and biophysical entities). Some Ayurvedic sages regard the body as being made up of six components (*ṣaḍ-dhātvātmaka*), while others opine that it of 24 components, (*caturviṃśat-tatvāmaka*). But, according to Caraka, on its cellular basis, it is made up of an infinite number of constituents. Ayurveda also recognizes that whatever is existing in the cosmos is represented in the body in one form or the other, and in this way it has been designated as a microcosm. In addition, it postulates that the existence and proper functioning of the body are dependent on the normalcy of what are known as *doṣas, dhātus,* and *malas,* which in turn, are dependent on proper food, celibacy, and the maintenance of equilibrium among the three kinds of basic desires *eṣana, dhana, prāṇa,* and *paraloka.* More significantly, the human body is treated as an important constituent of life and has been accepted as highly essential for the accomplishment of its fourfold objects, i.e. *dharma, artha, kāma,* and *mokṣa,* and its continuity through rebirth goes on till *mokṣa* or emancipation is attained. The very existence of the soul cannot be proved and realized without the body and, it is for this reason, that the human body remains a coveted object mythologically even for the inhabitants of heaven (*devas*). The science dealing with the structure and functions of such an important entity is known as *Śarīra* (anatomy and physiology) in Ayurveda.

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It should be noted that Ayurveda, the ancient Indian system of human psychobiology, deals with the entire nature of life as indicated by Caraka, comprising in short such types as the good or useful span of life, bad or harmful, happy or unhappy, and wholesome or unwholesome in relation to life. Caraka defines life as the union of body, senses, mind and spirit. Therefore, the subject matter falling under the head *Śarīra* incorporates within it the knowledge of basic facts related to the structure and behaviour of the body, senses, mind and spirit. It also encompasses the knowledge of the basis for the development of different types of life, and the factors that determine the inter- and intra-differences, and behaviour—patterns in the lives of individuals.

In Indian thought-structure, the human body is one of the favourite subjects. Its concept goes back to the *Atharvāṅgirasa*, the group of people associated specially with Atharvavedic literature. Inspired by the Vedic hymn, they proceeded to study human and other living bodies around the sacred fire known as *yajña*, which for the ancient lovers of knowledge was a relating principle between macrocosm and microcosm. During the Vedic age, the anatomy of the human body was understood, by examining the dead bodies, especially of children, who were not entitled to cremation. This led to the counting of bones and other organs of the body, and the knowledge so gained eventually found its way into the Ayurvedic classics, the *Caraka* and *Suśruta saṃhitās*.

The *Ṛgveda* speaks of various anatomical terms and the *Yajurveda* presents a long list of the parts of the body, which reveal the depth of knowledge of anatomy possessed by the Vedic priests.

In the *Atharvaveda,* a distinction between arteries and veins has been clearly made. The 20th *kāṇḍa* of this text gives details of anatomy dealing with various viscera and the skeleton. The term *hṛdaya*, referred to in the *Śatapatha brāhmaṇa,* denotes the functions of the heart, i.e., reception, expulsion, and pulsation, which may historically prove the existence of the knowledge of blood circulation before Harvey (16th century A.D.). The method of preserving body was in vogue as is evident from the epic Rāmāyaṇa of Vālmiki composed in 600 B.C. Following Vedic tradition, the *Suśruta saṃhitā* provides details of the examination of a dead body through a form of dissection. Instead of knife and scalpel, special types of brushes were used for carefully scraping a cadaver kept in water, and thus the anatomical knowledge was accurately gained by direct observation.

In the *Caraka saṃhitā* too, the knowledge of anatomy and physiology has been well delineated and its usefulness in the field of medicine well accepted. This knowledge also provided a scientific basis for Ayurveda. New concepts like chronobiology, homeostasis, acclimatization, constitution, theory of *doṣa, dhātu* and *mala*, digestion and metabolism, diet and nutrition, *srotas*, psychosomatic interaction, theory of *sāmānya* and *viśeṣa*, eugenics and genetics, concepts of cells and intracellular space, tissues, organs, immunity and immunization, geriatrics and gerontology, *svabhāvoparamavāda* and the law of *karma*, among others, reveal the methodological and systemic approach of Ayurveda nearly two thousand years ago. It is significant to note that Suśruta has described the seven layers of the skin and elaborated upon the vital parts and points (*marmas*) of the body controlling our life force on which the Chinese system of acupuncture was developed.

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In the West, the concept of and approach to the human body adopted by Galen (131-A.D. 201), could not make any headway till the time of Vesalius (1527-1543)—a long silent period, unlike in India wherein there was vibrant thinking on *śarīra*. Though the Vedic school of *Śarīra* made a slow but steady progress , there appeared a Bauddha monk named, Buddha Ghosha in the time of Kumara Gupta (380 to 440 A.D.), who wrote a book on meditation: The *Path of Purification* which has been published in English language in the Harvard series. The 6th, 8th and 11th chapters of this book deal with various anatomical and physiological concepts. The description of colour, shape and delimitation of various organs and parts of the body have been presented extensively in the text.

Here a question may be asked as to why a Buddhist monk who, with his devoted religious attitude, should turn his attention to medical science and become concerned with the subject of the human body. In India, the knowledge of the human body is supposed to serve at least three purposes: the first is medical; the second, mental as well as sensual; and the third one, is spiritual, i.e., to explain the spiritual processes through the control of senses and mind and also to develop a dislike and detachment with reference to the physical body which is taken to be the strongest obstacle to spiritual progress. Spirituality is the basic goal not only of Ayurveda, but also of all other Indian sciences and, for this reason, Ayurveda thinks of three levels, viz., *Adhyātmic, Ādhidaivic* and *Ādhibhautic*, and to understand in detail the mental, moral and spiritual levels of a seeker of exact knowledge. In order to explain the spiritual aspect, a knowledge of *Yoga* and *Jyotiṣa* (astronomy and astrology) have been considered as essential, and the concepts like *Manas, Ātma, Triguṇa, Lokapuruṣa-sāmya, Pañca-mahābhūtas, Ṣaṭcakras, Pañcakośas* and other religio-philosophical concepts, have been evolved as an integral part of medicine in India. Just as *Yoga* and *Jyotiṣa* help us to explain certain dimensions of Ayurveda, a subject like human body helps in the same manner. Ayurveda in turn helps to explain the mystery of *Yoga* and *Jyotiṣa* and related aspects. This is one of the reasons for the study of Ayurveda which was considered as essential even for philosophers and astrologers. It is pertinent to mention that the approach of an Indian science like *Śarīra* instead of being more descriptive, is rather synthetic with the object of finding unity in diversity, because a mere approach to diversity is an endless pursuit. Indian thinkers believed that the energy behind the gross is subtle, that the gross is only the manifestation of the latter and unless the subtle and the spiritual are properly understood and controlled, the gross cannot be truly understood and regulated. It may be pointed out, however, that we do not find in Ayurveda a detailed description of anatomy and physiology on the pattern of modern medicine; rather, we come across only the important anatomical landmarks, and their salient features of applied value.

At present, we take the word, *śarīra,* as meaning physical body, which a medical student dissects in the anatomy hall. Modern doctors knowing some aspects of human body alone, feel themselves elevated and contented. But, in fact, their knowledge is woefully crude and meagre, because it is limited only to the physical realm, while the human body has many aspects apart from the physical, infinite peculiarities and potentialities are associated with it, and they can be unfolded only by one who is successful in unfolding his own real nature (*ātmajñāna)*.

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According to the Vedas and the related *śāstras*, there are several abodes or worlds (*loka*), such as those of the gods, of subtle world and the Earth. These abodes are inhabited by several types of living beings. Depending upon its evolution, a living being (*jīva)* goes from the earth to higher abodes. For example, if a person in the physical world performs only noble deeds, remains totally detached from the worldly allurements, has no hankering for material gains, he becomes entitled to live in the subtle world (*sūkṣma jīva loka)* for a longer period after the death of his physical body, while others who do not live in this way, would go to the subtle world only for a short period and come back to the worldly life on earth, again owing to their powerful ties with the physical world. Indian religious literature has dealt with several kinds of living beings and their abodes.

***Dimensions of Śarīra*:** There are four dimensions of the concept of *Śarīra.* The first relates to its gross form (*sthūla*) made of the *pañcamahābhūtas* (five 'elements') with skin, bones, flesh, blood, tissues and the like, limited in time and space and operating in our wakeful state (*jāgṛtāvasthā)*. It has six aspects (*vikāra)*—existence, birth, growth, change, decay and eventually death. The gross *(sthūla śarīra)* is also regarded as a product of one's past but its deeds (*karma*) are capable of evolution. Ayurveda has examined the gross body in all its aspects, both anatomical and metabolic.

The second dimension of *śarīra* relates to its subtle state (*sūkṣma)*. Just as the physical body remains till its physical death and gets decomposed thereafter, in the same way the subtle body persists till the attainment of its emancipation. According to Sāṅkhya, one of the six systems of Indian religio-philosophy, the five sensory organs, five subtle ones called *tanmātras,* five motor organs, mind, intellect and ego—these 18 are the components of subtle body. Some scholars hold the view that ignorance, desire and actions also constitute the *sūkṣma* (subtle) body, also called *spṛika* or *liṅga śarīra*. In any case it does not include in it the *pañcamahābhūtas,* but is the seat of one's actions (*saṃskāras)*, carried from one birth to the other. It is also postulated that the subtle body comes into operation in the deep sleeping state.

The third one is called the *kāraṇa śarīra*. In the commentary on *Tattvārthasūtra,* it has been mentioned that after the death of the physical body, the subtle body needs another medium for its activity and movement, by taking the form of *kāraṇa śarīra* which carries with it the *liṅga Śarīra* from one place to other till it ceases to take the form of the gross body. The *kāraṅa śarīra* is stated to be made of three *guṇas* (*sattva, rajas* and *tamas*) and according to Swami Yogānanda, it comprises 35 *bhāvas*, (19 subtle and 16 physical).

The fourth dimension is called *mahākāraṇa śarira*, as conceived by the Vaiṣṇava, *Śākta* and Śaiva Ācāryas. According to them, this body is totally devoid of *rajas* and *tamas* but is only of *sāttvika* quality. This body, called variously, *baindava deha, mahākaivalya deha, cinmaya svarūpa* or *śakta deha,* is supposed to be possessed only by the Siddhas or Iśvara himself.

Apart from these body types as mentioned above, a few more types of body like *jñāna deha* and *bhāva deha* have also been thought of. The first one (of knowledge) is stated to be given to a disciple by his preceptor (guru*)*, and the second one obtained by the processes of intense practices (*bhāva sādhana)*. Scholars of Jaina philosophy have

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mentioned in their works, a few more types of bodies in terms of their qualities or actions, food and energy. But, it remains to be examined whether these body types can be incorporated under the aforesaid types of bodies or they have their separate entities.

Pañcakośas (five sheaths)

Just as a pillow is covered by a pillow case, in a similar manner, the soul is covered by the physical body, *prāṇa* (vital breath), mind, intellect and the causal body. These are five sheaths known as *annamaya kośa* (the food sheath), *prāṇamaya kośa* (the vital sheath), *manomaya kośa* (the mental sheath), *vijñānamaya kośa* (the intellectual sheath) and the *ānandmaya kośa* (the blissful sheath).

The food sheath is composed of the *pañcābhūtas*, (five 'elements') consituted of food, and it becomes food again; the vital heath is made of five vital breaths and five organs of action; the mental sheath consists of the mind, subconscious level and the five organs of knowledge; the intellectual sheath is composed of intellect and ego. Working in tandem with the five organs of knowledge, the last one is the blissful sheath, because through it the individual soul experiences the effect of a good deed, joy, peace and bliss. The five sheaths are related to our three bodies, the physical, astral and the causal. The physical body has only one sheath, in the food sheath, the astral has three sheaths i.e., vital, mental and intellectual, and the causal body has the blissful sheath.

The different bodies and the five sheaths cannot be understood by those whose mind is wrapped in material sheaths and who think that every thing is only material and gross. In the state of activity, man functions with his physical body and all the five sheaths are functioning. In the dream state, he functions with four sheaths (the vital, mental, intellectual and blissful). In the deep sleep state, he functions only with the blissful sheath.

Existence, birth, growth, change, decay and death are the qualities of physical body. Hunger, thirst, experience of heat and cold are the qualities of the vital sheath. Similarly, thinking, doubting, anger, lust, exhilaration, depression, deliberation, delusion, and the like, are the qualities of the mental sheath. Discrimination and categorization are the functions of the intellectual sheath; and lastly the experience of happiness (*ānanda)* is the attribute of the blissful sheath.

According to some scholars, the five sheaths are to be understood in the matrix of progressive evolution, namely, the object of matter is fulfilled only when it gets transformed into *prāṇa,* and *prāṇa* into *manas, manas* into *vijñāna* and *vijñāna* into *ānanda* (*Brahman*; Non-duality). In this process, the lower is not lost into higher, rather it is simply transformed. It is also explained by some scholars that, though matter cannot account for life, there cannot be life without matter. This phenomenon goes on with each material or life till it comes face to face with the ultimate reality. It is for this reason that spirituality has been treated in India as the ultimate goal of every phenomenon that takes place in this world. A brief account of the five sheaths according to this school of thought is as follows:

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i.	*Annamaya kośa*	Matter (inorganic to organic)
ii.	*Prāṇamaya kośa*	Life (vegetable to lower animals)
iii.	*Manomaya kośa*	Instinctive consciousness or perceptual mind (animal life)
iv.	*Vijñānamaya kośa*	Metaphysical plane (this distinguishes human being from lower animals; arts, science, philosophy, religion and the like become possible at this stage.)
v.	*Ānandamaya kośa*	Mystic plane, superhuman life (non-dual-bliss; the ultimate goal of matter and life).

Classification of Human Body as per Caraka and Suśruta

1. Classification on the basis of deha-prakṛti

Human body has been classified under the following seven heads: (i) *Vātika;* (ii) *Paittika;* (iii) *Śleṣmika;* (iv) *Vāta-paittika;* (v) *Vata-śleṣmika;* (vi) *Pitta-śleṣmika;* (vii) *Sama prakṛti* (balanced state of the three *doṣas).*

2. Classification on the basis of temperament

Sāttvika temperament: This has been sub-divided into: (i) *Brahma-kāya*; (ii) *Māhendra-kāya*; (iii) *Vāruṇa-kāya*; (iv) *Kaubera-kāya*; (v) *Gāndharva-kāya*; (vi) *Yamya-sattva*; and (vii) *Ṛṣi-sattva.*

Rājaṣika temperament: (i) *Āsura-sattva*; (ii) *Sarpa-sattva*; (iii) *Kaubera-sattva*; (iv) *Rākṣasa-sattva*; (v) *Pisāca-sattva*; and (vi) *Preta-sattva.*

Tāmasika temperament: (i) *Pāśava-sattva*; (ii) *Matsya-sattva*; and (iii) *Vānaspata-sattva.*

The above mentioned 16 types may be further sub-divided into countless types on the basis of minor doṣic and temperamental differences.

3. The anthropometric classification

Anthropometry was the third approach of Caraka and Suśruta to classify the human body. The unit of measurement used was the subject's own *aṅgula* (finger breadth; slightly less than one English inch). Standard measurements for the various body parts have been given in terms of *angulas* in Ayurveda also. It should be noted that the anthropometric approach is of therapeutic and prognostic value from the point of view of Ayurveda, because it gives an idea of the proportion of the different body parts to each other and probably it gave an indication of the population norm observed in the ancient period. The two great authorities of Ayurveda, Caraka and Suśruta, seem to hold a slightly different view in the matter of anthropometry. Caraka, after giving the measurements of various body parts, comments that individuals having the indicated measurements of the various body parts are strong, long lived and healthy, physically, mentally as well as immunologically, and are endowed with happiness, reputation, wealth, and other benefits of good things of life, while those who have either low or higher somatometric standards than those described by him, would not be associated with the qualities described above. On the other hand, Suśruta first gives the somatic characteristics of those who would have

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the maximum life span, and comments that those whose physique is contrary to what has been mentioned by him would be short lived, while others who have mixed characteristics would have medium span of life. In addition to these, he mentions a few characteristics that are particularly associated with individuals who have the medium as well as minimum span of life. Thereafter he gives the standard measurements of different body parts and lastly comments that individuals with the indicated standard of body parts would live long , while those who have some parts equal to the standard and others less than the standard would have a medium span of life. If all the body parts of an individual are less than the indicated standard, his would be the shortest life span. The upper limits of the three life span types noted above, according to Suśruta are twenty five, seventy and more than seventy years respectively.

4. Tissue predominance

The fourth approach to the typological aspect of a person is on the basis of tissues predominating in the physical make-up of persons. Both Caraka and Suśruta have categorized individuals into eight groups according to the preponderance of a particular *sāra* (the purest form of any tissue). Under this scheme of classification, mind is also taken as a refined tissue.

5. Compactness

The fifth approach towards the typifying of individuals is the compactness of their physique, or a well-knit body wherein the bones are symmetrical and well distributed, the joints well bound and the flesh and blood well integrated. In Caraka's natural view, persons with a compact physique are strong and those who are not compact-bodied are weak. Individuals of moderately compact physique are of moderate strength.

6. Sātmya

The sixth type of classification to infer individual differences is through the assessment of an individual's *sātmya* (tolerance or homologation). Caraka and Suśruta hold slightly different views on this aspect of psycho-somatic variation. The former divides persons into three categories, from the point of view of their tolerance or homologation for the different types of food articles. Group I comprises individuals who can tolerate well clarified butter (ghee), milk, oil, meat, juice and food materials of all the six tastes (*rasas*). Individuals belonging to this group are considered to be strong, tolerant of difficulties, and have long life. Group II consists of those who have homologation for only one dry article of food and to only one of the six tastes. They are regarded to be generally of low vitality, incapable of enduring suffering and having a short span of life. Such persons can usually achieve only limited socio-economic status. Group III comprises individuals who possess a mixed type of homologation and consequently they are of moderate strength depending upon the degree of their homologatory type.

Suśruta incorporates habitat, time, season, disease, exercise, water, and sleeping during day time as the factors that should be taken into account while studying a person for his *sātmya* or homologation. According to him, an individual may develop tolerance for these factors which otherwise would have been injurious to his psychosomatic type.

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To be more explicit, a substance having any one of the six tastes, or any kind of habit or physical exercise is said to be homologous to a man, which, instead of in any way telling on his health, would contribute to his positive pleasure and comfort. Apart from the above statement regarding homologation, Suśruta does not give any verdict on the human groups based on it. But it is evident from the context of the views of *Suśruta saṃhitā*, that homologation has been availed of as a factor for the classification of human subjects by Suśruta as well.

7. Physical strength

The seventh approach to categorize human variation is through the assessment of the physical strength of a person as proposed by both Caraka and Suśruta. Physical stability and the capacity for physical labour have been mentioned as the parameters in this respect. Caraka has proposed another indirect approach to determine the strength of a person in terms of the assessment of his capacity to ingest and digest the food materials. He is of the view that the strength and life span are dependent on diet. However, while assessing it, due consideration is to be given to the birthplace of a person, apart from the other factors like age, season, diet, economic status, exercise, habits, and parentage.

8. Appetite and digestive capacity

The eighth method of classifying human body is to assess a person's appetite and digestive capacity on which Suśruta holds a different view from Caraka. The former divides individuals into four groups in accordance with the four types of *agni* (digestive capacity) associated with them: *sama, viṣama, tīkṣṇa,* and *manda*. The first type of persons are those who fully digest the ingested food taken at the proper time; it also reflects the balanced state of the three *doṣas*. The digestive heat or *agni* which is irregular in its action and which sometimes digests the food completely and sometimes causes abdominal distension, colic, constipation, dysentery, heaviness in the abdomen, intestinal rumbling and tenesmus before digesting the food, is known as *viṣama*. The digestive heat (power) which digests even a heavy meal quickly, is the *tīkṣṇa* or acute. It repeatedly digests heavy meals in a short time and, after the completion of digestion, produces dryness, burning and heat in the throat, palate and lips. The heat or power which digests a light meal slowly and even so after sometime, and produces heaviness of the abdomen and head, cough, dyspnoea, nausea, vomiting and physical exertion, is known as *manda* or sluggish. After describing the characteristics of the different types of digestive capacities (*agnis*), Suśruta comments that *viṣamāgni* or irregular digestion results in *vātic* diseases, the *tīkṣṇagni* or acute digestion in *paittic* disorders and *mandāgni* or sluggish digestion in *kaphaja* diseases. Therefore, an effort should be made to maintain the *samāgni* in an unimpaired state and the remaining three types of disorder should be corrected by appropriate methods as described in the text. Thus, there are four types of human subjects in accordance with their digestive capacity or *agni*.

9. Psyche

The categorization of the human bodies has also been done on the basis of the psyche of an individual, which in the present context should be assessed with regard to its threshold

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for psychosomatic endurance. Suśruta mentions three human groups in accordance with the type of psyche associated with them. These are *sāttvika, rājasika* and *tāmasika*. The first type of individual remains unperturbed either by loss or gain. He is capable of enduring every psychosomatic strain by strength of his will. He does not require any moral support from others at the time of calamity. On the other hand, the second or *rājasic* type of person can endure suffering with moral support from others, while the third, the *tāmasic* type, is unable to endure suffering under any circumstance.

Caraka assigns to the psyche the position of the controller of the body by virtue of its connections with the soul. In his opinion, the psyche is of three types in the light of the variations in its strength. These are known as the *pravara, madhya* and *avara sattva* respectively. Individuals of the first type, though possessed of small bodies and in spite of being affected by severe ailments of either exogenous or endogenous origin, feel unaffected owing to the preponderance of *sattva guṇa* in their psyche. Those of the second type of psyche seek consolation by comparing themselves with others or are consoled when comforted by others. However, those who belong to the last type of psyche are not composed either by their own will power or by consolation from others. Although they possess big bodies, they are incapable of enduring even ordinary sufferings. When confronted by fear, sorrow, temptation, delusion or disgrace or if they are made to listen to tales of wrath, sorrowfulness, hate, horror, ugliness or to see sights of mangled flesh and profuse bleeding in animals or men, they suffer from depression of spirit, pallor, fainting, giddiness, insanity or even death.

10. Age

The tenth approach of Indian medicine towards classification of the human body is according to the individual's age. The chief authorities on Ayurveda have divided the total life-span into three broad periods, *bāla, madhya,* and *vṛddha*. There is, however, a difference of opinion about the age limit of each of the three major periods amongst the different authorities. Each period has also been further divided into sub-periods differently by different authors.

According to Suśruta, the period of *bāla* lasts up to the age of sixteen years. He has further divided this into three sub-periods : (i) *kṣīraja* (those who take only milk as their diet up to one year); (ii) *kṣīrānnada* (those whose diet consists of milk as well as other food articles; up to 2 years); and (iii) *annada* (those for whom milk is not absolutely essential for their survival and they can consume all the articles of food; 3 from 16 years).

The *madhya* period lasts between the ages of sixteen and seventy years. This period is divided into four sub-periods: (i) *vṛddha* period in which the physical organs continue increasing in size (up to 25 years); (ii) *yauvana* or period of youth (up to the age of thirty years); (iii) *sampūrṇatā* (completion) during which all the body tissues, organs and strength reach their perfection (up to 40 years); (iv) the period of *hāni* (loss), which lasts between forty and seventy years, during which the outweighing of the low-grade anabolic process by which slow catabolism starts. The period of *vṛddhāvāsthā* or old age starts after the age of seventy. During this period catabolic processes proceed speedily in the body, which gradually make a person weaker. This period is also associated with graying of the hair, baldness, wrinkling and respiratory disorders.

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Caraka fixes the upper limit of the *bāla* period as the first thirty years of life against the first sixteen years fixed by Suśruta, and divides it into two sub-periods: (i) up to the sixteenth year, during which all the tissues of the body are immature, the body is tender, unable to stand strains, has incomplete strength and the *sleṣma* or *kapha* is predominant in it; and (ii) from the age of sixteen years up to the age of thirty years, during which the body tissues are progressively growing but the mind is unstable.

According to Caraka, the middle period of the life starts after the age of thirty years and lasts up to the age of sixty years. During this period, a person's strength, valour, virility, enterprise, understanding, retention, memory, speech, discernment, and all the body constituents attain a state of balance. His strength gets settled, the mind becomes stabilized, the qualities of all the body constituents are under control and the *pitta* element is predominant in him. After the age of sixty years, the faculty of the body constituents, sense organs, strength, energy, virility, valour, understanding, retention, memory, speech, and discrimination begin to decay i.e., the properties of the body constituents start decaying, the *vāta* element is predominant, and the body starts gradually wearing down till the age of a hundred years.

The standard life-span of human beings was one hundred years as mentioned by Caraka. But he acknowledges the presence of individuals who then lived either more or less than one hundred years. In their cases, according to him, the three divisions of the life span should be made after due consideration of their strength and the characteristics of their psychosomatic make-up, but devoid of pathological conditions.

Vāgbhaṭa's *Aṣṭāṅgahṛdaya* division of the life-span into three periods is similar to that of Suśruta. But he does not describe the sub-periods with their details as Suśruta. According to Vāgbhaṭa, the *bāla* period lasts up to the age of sixteen years, during which all the body constituents are in a stage of growth. The middle period lasts between sixteen and seventy years, and during this period, the body tissues remain in a state of metabolic balance. He designates the third period of life by the term *kṣaya* which starts after the age of seventy and during this period all the body tissues start decaying.

The author of *Aṣṭāṅgasaṃgraha*, whose name is also Vāgbhaṭa, holds a slightly different view from the aforementioned authorities concerning the age limit or the three periods of life. He opines that the *bāla* period lasts up to sixteen years and after that the *vṛddha* period starts. He subdivides the *bāla* period into three divisions on the basis of food habits without giving their age limits. Similarly he subdivides the middle period also into three: *yauvana*, (lasting from seventeen to thirty years), *sampūrṇaṃ* (between thirty-one and forty years), and *aparihāni* (lasting between the ages of forty and sixty years). The main characteristic of the *bāla* period is an all-round growth with the preponderance of *kapha* in the body. Therefore, the physique of children is soft, tender and incapable of standing much strain and they are less prone to anger.

Vāgbhaṭa says that *pitta* abounds during the *madhya* period, resulting in the acuteness of digestive functions, preponderance of intellect, psychosomatic maturity and firm resolution. *Yauvana* lasts up to the age of thirty years. Between the age of thirty and forty years, strength, energy, virility, memory, speech, discrimination and modesty become perfectly developed. Therefore, this period is known as *sampūrṇatvaṃ*. Thereafter starts

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the period of *aparihāni* that lasts up to the age of sixty. The character of this period is the state of metabolic balance. During the period of *vṛddha*, the signs of tissue decay start appearing, and it is associated with a preponderance of *vāyu*.

In addition to the foregoing categorization, there are two other methods of body classification based on what is known as *koṣṭa* (soft, medium and intense) as well as in relation to the character of a person (*nindita* or *anindita*).

It should be emphasized that the foregoing attempt at categorization is in the framework of the *doṣa-prakṛti* scheme of classification, which incorporates within it the morphological as well as functional characteristics of the total psychosomatic personality.

THE HUMAN BODY AND ITS VARIOUS PARTS AS DESCRIBED IN AYURVEDA

According to Ayurvedic texts, human body comprises six major parts, viz., the two upper and two lower extremities, the trunk, the head and neck. Besides, they have enumerated some subsidiary parts like the calf, the abdomen, the navel, the forehead, nose, and chin. Further, they have also counted the parts that are in pairs such as ears, eyes, eyebrows, temples, shoulders, cheeks, armpits, breasts, testes, sides, buttocks, knees, arms, and thighs. It should be noted, however, that these are the parts that are seen externally on the body. The texts have classified the internal body parts as well, briefly enumerating the 7 layers of skin, 7 *kalās*, 7 *āśayas*, 7 elementary *dhātus*, 300 bones, 310 joints, 900 *snāyus*, 500 *peśis*, 700 *vessels*, 24 *dhamanis*, 107 *marmas*, 3 *doṣas*, 3 *malas*, 9 external orifices, 16 *kandaras*, 16 *jalas*, 6 *kūrcas*, 4 *rajjus*, 7 *sevanis*, 14 *saṅghātas*, 14 *sīmantas*, 22 *yogavati srotasas* and 2 kinds of intestines.

Divisions and sub-divisions of śarīra as indicated in Ayurveda:

(1) *Abhinivṛtti śarīraṃ*	a) *Dhātubheda śarīraṃ*; (development or componental anatomy)
	b) *Garbhavakrānt śarīraṃ* (embryology)
(2) *Viniścayaśarīram*	a) *Aṅgavibhāga śarīraṃ* (toponomy or topology)
	b) Sāṅkhya *śarīraṃ* (systematic or numerical anatomy)
(3) *Aṅgaviniscaya śarīram*	Mḥtaśodhanaśarīraṃ (practical anatomy)
(4) *Vyākaraṇa śarīraṃ*	(descriptive anatomy)
(5) *Marma śarīraṃ*	(surgical anatomy)
(6) *Pramāṇa śarīraṃ*	(metrical anatomy)
(7) *Doṣa-dhātu-mala śarīraṃ*	(functional anatomy or physiology
(8) *Vikṛtivjñānīya śarīraṃ*	(morbid anatomy or pathologic physiology)

The analytic and systematic knowledge of the structure and functions of the body is essential for its better maintenance, because only with the sound knowledge of the machinery or mechanism of the body, can one understand all those substances or

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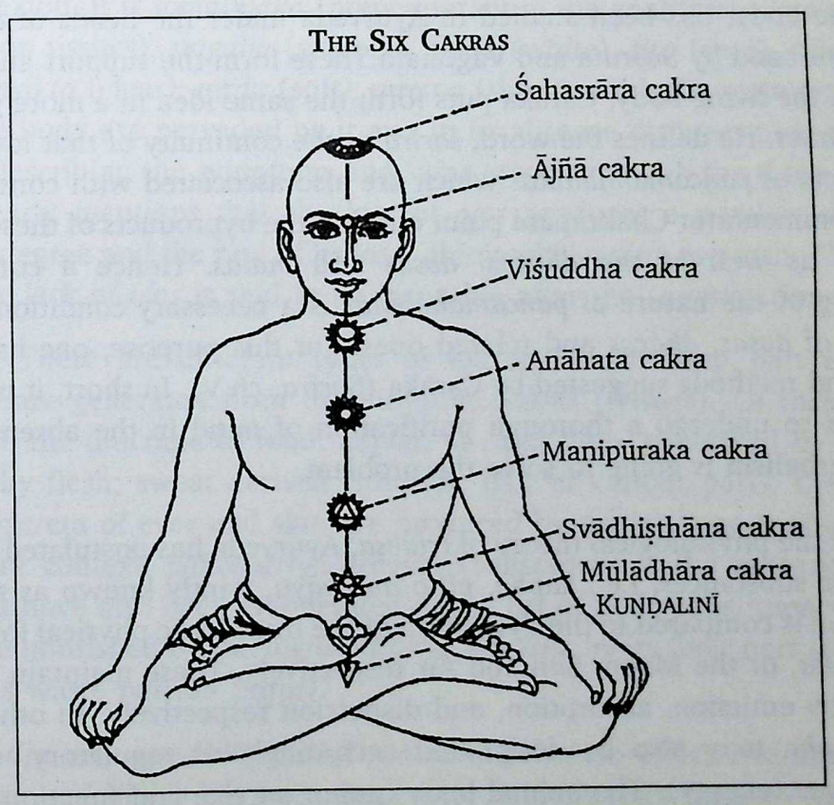
processes that are beneficial to the body. Hence, Ayurveda has attached great importance to the anatomical and physiological knowledge of the body. It has recognized that a physician or surgeon who knows the entire body in all its aspects would possess the complete knowledge of medical science, and through it he could augment happiness by restoring and maintaining the health of human beings. A medical man who knows the anatomy (structure) and physiology (functions) of all the structure of the whole body does not suffer from confusion in practice which may arise for want of this knowledge.

The Kuṇḍalinī

At this stage, there is one model of the human body which needs some consideration. According to the yogic and tantrik postulate of *cakras*, there is a 'Residual Serpent Power' called *Kuṇḍalinī* which supports the individual's body and mind, having its seat designated as the *mūlādhāra cakra,* i.e., the root or basic support of the spinal cord known to anatomists as the coccygeal bone or coccyx. When aroused, this power uncoils and takes its upward march in an evolutionary manner loosening its bondage. In this process, from *mūlādhāra*, it ascends to the second *cakra* called *maṇipūra cakra*, supposed to be situated at the navel region. Thereafter, it goes upwards to the *anāhata cakra*, situated at the



sterol region from where it moves towards the *viśuddha cakra* which is situated just above the sterol notch; from this, it reaches *ājña cakra,* located just between the two eyebrows and finally it reaches *sahasrāra cakra* situated at the parietal region. These landmarks relating to the sites of the six *cakras* are merely symbolic, because, as a matter of fact, the *Kuṇḍalinī* is presumed to be situated in the subtle body.

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It is stated that, by virtue of unfolding *kuṇḍalinī śakti* or power, a person comes face to face with the entire reality that encompasses nature and one's own self. This power is also the driving force behind our *prāṇa-tattva* (life force), which operates in the gross body in the form of *ojas* and which is responsible for all normal physiological functions of the body including the *vyādhikṣamitva* (immunity). The *ojas* itself assumes the form of *tridoṣas* as the primordial substance for the creation of the human body as well as the controller of its entire physiological functions. The *doṣas* which are an outcome of the *ojas,* are liable to be vitiated through a number of internal and external environmental factors like our diet, behaviour and the like, making the person likely to suffer from diseases. But in practice, to a great extent, we remain healthy in spite of our minor deviations from normalcy. This is again because of the presence of *ojas* which is responsible for the maintenance or preservation of immunity.

This principal, immunity has been dealt with in Ayurveda in the same manner as modern medical science does even today. The classical Ayurvedic texts have classified immunity into innate *(sahaja),* seasonal *(kālaja)* and acquired *(yuktikṛta)*. It has again been broadly classified into the natural or non-specific type, and the specific type.

Doṣa-dhātu-mala

Śarīra, or the body, has been studied in Ayurveda under the heads of *doṣa, dhātu and malas* as mentioned by Suśruta and Vāgbhaṭa.These form the support and constitute the root cause of the living body. Caraka puts forth the same idea in a more generalized and scientific manner. He defines the word, *śarīra* as the continuity of that ideal combination of the products of *pañcamahābhūtas* which are also associated with consciousness. Both he and the commentator Chakrapani point out that the byproducts of these are the tissues of the body as well as the *dhātus, doṣas* and *malas.* Hence a correct and clear understanding of the nature of *pañcamahābūtas* is a necessary condition for the proper appreciation of *doṣas, dhātus* and related ones. For this purpose, one has to follow the techniques and methods suggested by Caraka (*Śarīra*, ch.V). In short, it is the practice of *Sāṅkhya-Yoga* to undergo a thorough purification of mind in the absence of which no amount of verbalism is going to solve the problem.

***Doṣas*:** Under the physiological theory of *tridoṣa*, Ayurveda has postulated the presence of three dynamic substances, i.e., *kapha, pitta and vāyu*, jointly known as the three *doṣas*, whose function is compared to the dynamism of the three basic physical forces, i.e., *Soma, Sūrya* and *Anila*, or the Moon, Sun and Air respectively. These maintain the integrity of the universe by emission, absorption, and dispersion respectively. In other words, *vāta, pitta,* and *kapha* may also be designated accordingly as regulatory, excitatory, and inhibitory forces (energy). The animal body cannot survive and function in the absence of any of the three *doṣas*. These are of two varieties: the one inherited from the parents, and the other, derived from the food material ingested by an individual. The inherited part does not undergo any change during one's lifetime. However, that part which is derived from the food would fluctuate by way of the relative increase of the type of food one takes, and the decrease of other types. The fluctuation is also dependent on a number

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of factors like the kind of food ingested, climate, geography, age, emotional state, and psychosomatic preoccupations. Their relative status in the body can be inferred by the physio-pathological symptoms produced by them.

Dhātus and Upadhātus: According to Ayurveda, the physical aspect of a living body is constituted of seven *dhātus* (tissues), viz. *rasa, rakta, māṃsa, meda, asthi, majja* and *śukra* (the essence of digested food, blood, flesh, fat, bones, marrow, and reproductive essence respectively). The seven *upadhātus* (auxiliary ones) are evolved from the *dhātus,* but only partially perform the function of a *dhātu* in the strict sense of the word. They are: the *stanya* evolved out of the *rasa*, *asṛik, kandara,* and *sirā* formed out of *rakta, vasā* and six *tvacas* from *māṃsa;* and *snāyu* from *meda*. Then there is *ojas*, which is thought to be derived from the essence of all the tissues. According to another view, however, *ojas* is derived directly from the *śukra* as its essence. Functionally, it is considered to be the most important content of the living body. It appears to be anabolic in nature and constitutes the basis of life processes that cannot subsist in its absence. The above qualities of *ojas* can be inferred from the functions attributed to it by the authorities of Ayurveda. Suśruta says: 'It brings about the development of strong and bulky muscles. It maintains the functional integrity and the tone of motor, sensory and intellectual faculties. It keeps up the initiative and drive in all the psychosomatic activities, and induces pleasantness in voice and complexion. It is *somātmaka* (preponderant in the quality of *soma* which has a formative effect on tissues), *snigdha* (smooth), *śukla* (white), *śīta* (cool), *sthira* (stable), *sara* (diffusive) *vivikta* (clear), *mṛdu* (soft), *mṛtsna* (slimy) and is the main seat of life. All the tissues of the body are pervaded by it and in its absence disintegration starts in the animal bodies'. Describing the symptoms and signs associated with the three disorders of *ojas,* Suśruta clearly mentions that the loss of *ojas* produces a number of symptoms according to the degree and the rate of its loss, ultimately leading to death. The condition arising out of the lack of *ojas* is said to be incurable after the supervention of coma.

Mala (excreta): There are different types of excreta which form part of the body constituents and are generated from the different *dhātus* (tissues). Of these, *vāta* and *mūtra* (urine) are the outcome of food; *kapha*, of *rasa; pitta,* generated by blood; *kha-mala*, produced by flesh; sweat derived from fat; hair of various parts, the product of bones; and the excreta of eyes and skin are produced by *majja* (bone marrow).

In a different context, *pañcendṛiya dravyas* (substances of the sensory and motor organs) and nails have also been enumerated in the list of body constituents by Caraka, both of which are nourished by the ingested food, the first by its finer part (*prasāda*) and the second, by its waste portion (*kiṭṭa*).

Relationship of dhātus, upadhātus and malas: The cause–effect relationship among *dhātus, upa-dhātus* and *malas* has been dealt with in a succinct form by Vāgbhaṭa, the author of *Aṣṭāṅgasaṃgraha*. He says that the essence of *rasa* is *rakta* (blood), while *kapha* and *lasika* are its excretions or waste products. The essence of blood is flesh, *kandara* and *sirās*, while its waste product is *pitta*. The essence of flesh is fat, skin and *vasa,* and its waste products are the excretions of the ears, eyes, nose, oral cavity, hair roots and sex organs.

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The essence of fat and bone is muscles and joints, and its waste product is sweat. The essence of bone is marrow and its waste products are hair on various body parts as well as nails. The essence of marrow is *śukra* and its waste products are the grease of the eyes, faeces and skin. Finally the essence of *śukra is ojas,* there being no waste product of *śukra* due to its extreme purity. Extending the views of the contemporary authorities, Vāgbhaṭa adds that 'due to the extreme purity of *śukra*, some authorities disbelieve in its further digestion and the resultant production of its essence is *ojas*'. Others believe that the essence of *śukra* is *garbha* (the contents of the fertilized ovum). Vāgbhaṭa unequivocally acknowledges the microscopical and dynamic nature of all the *dhātus* and *malas*, both of which are regularly supported by the *vāyu* of the food ingested.

In the above description, nothing appears to be said about the production of *vāyu*, the most powerful of all the three *doṣas*. It is also produced as a result of the interaction between relatively less or more food in proportion to *agni* (digestive agent) and *vice versa*. Caraka also refers to the production of *vāyu* from the waste products or excreta of the food ingested. One should not, however, get confused that Ayurveda believes in watertight compartmentalization of the *doṣas, dhātus and malas*. It has defined the *doṣas* as those substances that defile/vitiate/disturb the normal physiological functions of the body; similarly the *dhātus* have been defined as those substances that help and support the normal physiological functions of the body, and *malas* which obstruct or cause imbalance in the normal physiological functions, meaning thereby that the *doṣas* and *malas*, in their normal state may function as *dhātus* which, in their abnormal state may also function as *doṣas* and *malas*. Thus, the main emphasis in Ayurveda has been laid on their equilibrium and normalcy, applying the principle of *sāmānya-viśeṣa siddhānta.*

The Concept of Genetics and Eugenics in Ayurveda

In order to understand the scientific nature, relevance and significance of related Ayurvedic principles and their relationship with modern genetics, it would be better to consider first the concept of modern human genetics. The very term, genetics, is derived from the Greek root *gen*, which means 'to become or grow into something'. Broadly, it has been defined as a study of human inheritance, and it is concerned with the existence of inborn characteristics of human beings, physical and mental, normal and abnormal, their similarities and differences, the way in which they are transmitted from generation to generation, and also with the methods by which they can be modified and controlled.

A close examination of Ayurvedic *saṃhitās*, reveals that the above aspects of genetics have been meaningfully taken into account. Ayurvedic savants of the ancient period efficiently considered the genesis of man, how his constitution would be determined by the play of *doṣas;* the permutation and combination of *pañcamahābhūtas* would give rise to specific colour of skin; the method of getting purity of *sukra* and *śoṇita,* to get a desired male or female child, and how to prevent the birth of a short lived, mentally deficient, or an impotent child.

The three terms used by Chakrapāṇi i.e. *bīja, bījabhāga and bīja-bhāgāvayava*, can very well be taken as corresponding to modern germ cells, chromosomes and genes

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respectively. It would not be inappropriate to state that Ayurvedic scholars had the knowledge of germ cells and genes long before Mendel (1882-1884) and James Watson. Caraka has clearly stated that developmental abnormalities are due to the defect in fine fractions of the germ cells which are responsible for the development of the concerned part, which is also a fact according to our modern knowledge.

PAÑCABHAUTIC NATURE OF BODY PARTS

Those structures in the body which are especially bulky, firm, solid, rough and hard, have been designated as *Pārthiva;* for example, nails, bones, teeth, cutis and hair etc. The organs of smelling are also regarded as *Pārthiva*. Those organs that are fluid, moving, mild, oily, soft and sticky, are treated as *Āpya*; eg. *rasa, rakta, vasā,* and urine; the sense organ of taste is also treated as *Āpya*. That which is hot like *pitta*, the lustre of the body, the organ (eyes) and sense of sight are *Āgneya*. Expiration, inspiration, opening and twinkling of eyes, contraction and expansion, motion and impulse, retentive memory, and the like as well as the organ (skin) and sense of touch are *Vāyavya*. That which is detached, minute as well as large *srotasa*, the organ (ear) and sense of hearing are all of *Antarikṣa or Ākāśa*.

CONCEPT OF EMBRYOLOGY

In the Ayurvedic texts, embryology has been visualized as the coalescence of the male and female seeds in the uterus where the 'soul' combines with them intimately along with the eight *prakṛtis* (elementary principles) and its sixteen formations (*vikāras)*

After conception, the five elements help in the formation of the fetus. In this process the *vāyu* causes segmentation (cleavage), *tejas* helps in initiating vital processes and keeps it soft and moistened, while *pṛthvī* strengthens the structure and *ākāśa* provides space and helps in its development. The embryo becomes a body *(śarīra)* with all its constituents and organs, including the sense organs, only when it is supported by the five elements.

The five elements also play a vital part in the formation of the complexion of *garbha*. *Tejas* is the cause of the nature of complexion that is determined at the time of cohabitation itself. According to some scholars, the colour of food articles consumed by a pregnant woman determines the colour of the newborn. It has also been stated that the colour and complexion would differ according to the environment of the country, time and even the behaviour of the couple. The mental characteristics of a child are determined according to the characteristic features of the woman who conceives. If a woman has clean and pure habits with good character and religious mind, she would give birth to a child of extraordinary virtue. The habits, behaviour, activities, food and tendencies of the couple would have their effect on the physical and mental state of the newborn.

Congenital abnormalities also take place, according to Ayurveda, due to the erroneous or improper lifestyle and emotions of the mother. It has been further pointed out that the irreligious thoughts of parents, sins of a past life, time of the seed

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impregnation and also diseases of the mother, could cause abnormalities in a foetus. The monthwise development of the foetus has been recorded in Ayurvedic texts as follows:

First month: formation of a condensed mass (*kalal*); ***second month***: this mass with the help of *kapha, pitta* and *vāyu*, becomes more soild and takes the shape of sexless irregular mass; ***third month***: emergence of bud like protrusions, representing the rudimentary head and limbs; in this month also appear all the eleven *indriyas* and structures of the body; ***fourth month***: all organs become still more distinct; the heart is now ready to perform all vital functions; ***fifth month***: power of the mind further develops, and fleshy and muscular parts also grow; ***sixth month***: feelings of pain and pleasure become evident; ***seventh month***: further development occurs in the primary and secondary organs, and the fetus is now endowed with complete physical structure; ***eighth month***: *ojas* begins to take firm hold of the body, though by itself it is unstable; and the ***ninth month*** has been considered as the month of delivery.

In this way, we find that the observations made by our sages hold good even in the present modern scientific era. It is interesting to note that the sages without the help of any modern tool available to them in those days, could discover the seven layers of the skin, which are similar to modern scientific findings. The layers enumerated by Suśruta are: ***layers of epidermis***: (i) *Avabhāsini* (stratum corneum); (ii) *lohita* (stratum lucidum); (iii) *śveta* (stratum granulosum); (iv) *tāmra* (Malpighian layer); ***layers of dermis***: (v) *vedinī* (papillary layer); (vi) *rohiṇī* (reticular layer); and (vii) *māṃsadhara* (subcutaneous tissue and mucous membrane)

NERVOUS SYSTEM IN AYURVEDA

The nervous system in Ayurveda has been explained under the functions of *manas* and five types of *vāta*, namely, *prāṇa, udāna, samāna, apāna* and *vyāna*. Among them, the first is associated, as noted before, with *ājña cakra* and *viśuddha cakra; udāna vāyu* is associated with the *anāhata cakra; samāna* with *maṇipūa cakra*; *apāna* with *svādhiṣṭhāna* and *mūlādhāra cakra;* and *vyāna vāyu* with all the *cakras* because of its all pervasive nature. There is much similarity and correspondence in the functions of *vāyus* and *cakras*. The *cakras* and *vāyus* are again found associated with the different autonomic ganglia of the nervous system which regulate and perform different functions of the body.

DIGESTION AND METABOLISM

The *rasa* is formed as the end product of what is known as *avasthāpaka*, followed by *niṣṭhāpaka,* which divides *rasa* into *prasāda* and *kiṭṭa* portions. The first is again metabolized by the *bhūtāgni* which transforms the heterogeneous substances into homogeneous ones so that they may become acceptable to the body. Thereafter, the *prasad* portion is again metabolized by the *rasa dhātvagni* to maintain the *rasa dhātu* and transform it into *rakta dhātu*. In this manner all the seven *dhātus* are maintained, nourished and finally transformed into *śukra* and *ojas*. The *kiṭṭa* portion of the food is

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excreted in the form of faeces and urine, through their respective excretory systems. In this manner Ayurveda holds that the digestive and urinary systems are intimately related. This concept is of much applied value because, in clinical practice, it is observed that whenever there is some disorder in the digestive system, the urinary system also gets impaired simultaneously.

RESPIRATION AND CIRCULATION

Ayurvedic ideas on respiration and circulation of blood need special mention. After giving a detailed account of the organs of respiration, the texts have also mentioned the gaseous exchange through the respiratory system, i.e, the elimination of what we now call carbon dioxide (CO_2) and the intake of oxygen (O_2) in the body. In Ayurvedic texts the words *ambar pīyuṣa*, might refer to the active constituent of air or oxygen (O_2).

Literally the term, *hṛdaya* explains the concept of circulation and the functions of the heart. *Hṛdaya* has been defined as that organ which *āharati* (receives), *dadāti* (gives), and *eti* (is constantly pulsating)

LATEST MODERN MEDICAL VIEWS ABOUT THE HUMAN BODY

In modern medicine, the human body is usually taken as a superior type of mechanical device. The stomach is a 'boiler' for burning the food, the heart is a pump, the skin is a radiator, and the brain is a 'switch-board' with innumerable valves, thermostats, governors, etc. But this mechanical analogy of modern medicine too is now becoming out of date. In a sense, the human body does not have discrete organs. The different organs are so interlinked and inter-dependent that any attempt at understanding them in isolation is actually unscientific. Of late, medical men, in order to understand the underlying basis of the processes of life in its states of health and disease, are turning more towards chemistry and, after unraveling the mystery of cells, they have come to realize that the cellular basis of our body is never exactly the same from one split second to another. The substance of our body is continuously breaking down and is rapidly being renewed. A close and incessant kind of molecular reshuffling is going on within us all the time. In reality, an individual is not precisely the same person that he was even a minute ago and our organs are not static and independent structures that appear to be so in modern anatomical illustrations.

Thus, from what has been stated above, it can be concluded that the body is not simply a physical framework as is generally envisaged; rather it is an ever changing organism, veiling the soul in various stages of its long journey. Every change taking place in it, from time to time, is determined by the supreme consciousness living within and outside the body. The sages of Ayurveda, after realizing this scientific truth, took it as a futile and endless task to run after the study of the diversity of matter and, therefore, they found out factors that were common to all of them. They, thus developed the inter-related concepts of *pañcamahābhūtas, tridoṣas, rasa, guṇa, vīrya* and *vipāka*, which are actually

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more scientific and practical than the modern approach to medicine. According to the Ayurvedic sages, *tridoṣa* is that aspect of the life force (*tattva*) which assumes different forms and names in regulating the entire range of physiological processes (physical or mental) to keep a person alive and healthy. They also propounded that energy could be regulated through the use of matter (food) taken according to *rasa*, *guṇa* and other properties. It is now known that science too has propounded that the matter and energy are actually two aspects of the same coin. Mass can be converted into energy, and energy into mass; this explains the rational basis of the *tridoṣa* theory.

We cannot acquire real knowledge about the human body through any amount of intellectual study or laboratory experiments alone, but we can really understand it from the unlimited source of wisdom and knowledge gained during the silent hours of exalted contemplation, when mind and intellect cease to function. This was the path followed by our sages and given to us by them for obtaining real knowledge about our body or about any other material or subtle thing. After gaining a through knowledge and control over one's physical and astral body, one can move into introspection and ask 'who am I?' In this inward quest, one comes face to face with the ultimate truth (God), whereby one knows that there is neither pain nor sorrow, superiority nor inferiority, nor any individuality nor separation. This knowledge which brings an experience of ***oneness*** with the whole world is referred to by Caraka as *Loka Puruṣa Sāmya,* by which does man no longer see himself as man but becomes identical with the Supreme Being. This experience which is beyond ordinary understanding is the real objective of Ayurvedic anatomy studied by vaidyas and yogis. This is the end of all knowledge; here remains no distinction between the knower, the knowledge, and the known. This has been the real methodology of research in Ayurvedic *śarīra* or any other field of Ayurvedic medicine.

As already pointed out, in order to understand the scientific nature of Ayurvedic *śarīra*, we have to refer to Sāṅkhya philosophy which believes in the theory of *saṭkāryavāda*, according to which there is no effect without a cause, rather the effect is nothing but the unfolding of the cause itself. The basic cause of all the subsequent causes and effects is *Prakṛti*, which may be regarded as the positively charged aspect of the one and only reality, and its negative interaction is *Puruṣa*. The positive aspect, to be in fulfilment with the negative, sets into motion, and this primordial motion is the basic cause of all other motions manifested as divergent forms of matter and energy in this universe. The causes of this diversity are time and space either singly or together. The basic motion under the effect of time and space assumes varying degrees and frequencies with the result that the various collisions, frictions and physio-chemical combinations come into being. These ultimately lead to the formation of different substances having diverse peculiarities and potentialities. Owing to the basic attraction of the negative with the positive, the male and female attract each other, rivers flow, the particles of an atom move, and the sun and planets emanate their rays. The primordial energy is the substratum of all other energies which we have come to know in the form of atomic, magnetic, electrical, solar and even those which we may come to know in future. It is this basic energy that is keeping the life-current flowing within our body as well as in the bodies of plants and animals, leading them to grow and flourish on the one hand and, on the other,

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inducing our heart to pulsate, glands to secrete hormones and juices, liver to metabolize substances, excretory organs to function, and brain and nervous system to generate and receive impulses. In this perspective, the present day anatomists, physiologists, pharmacologists and others are engaged in studying the footprints left by this one and only energy, which prevails everywhere. Everything exists while there is play of this energy, and all will cease to exist with the end of this play.

If the flow of this energy is in a proper and proportionate state through our body channels, the result is health, which is manifested as happiness. Our sages could envisage that the flow of this energy within the body is always being effected by the energy flowing in and around it, and that it does not remain the same during the different parts of day and night, each fortnight and month, and the two-halves of a year. This phenomenon led them to postulate the theory of *ṛtucaryā* which aims at keeping the balanced flow of energy within our body systems in different seasons. In order to understand the value of the proper flow of this energy, one can consider the example of a magnet which is nothing but a simple iron piece having its domain of atoms moving in a particular structure, no sooner is this quality of iron lost, than it loses its magnetic force. This is sufficient to prove how the proper or improper flow of energy can affect an object, and the same is also the true with our body.

Just as the Ayurvedic sages developed the theory of *tridoṣas,* so did the other sages endeavour to understand and explain cosmic energy in the form of the external environment, and developed the science of astronomy. Ayurveda and certain astronomical phenomena are in a way inter-related.

From the foregoing presentation it becomes evident that the Indian concept of *śarīra* not only has the material dimensions as in the western anatomy and physiology, but it also encompasses other dimensions: viz. psychic and spiritual. The real appreciation or the degree of understanding of *śarīra* as conceived and depicted in Ayurveda would depend upon one's own mental and spiritual status.

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CHAPTER 4

Kāyacikitsā (Internal Medicine)

R.H. Singh

Ayurveda is one of the most ancient medical sciences of the world. It is considered as the *upaveda* (auxiliary)of Atharvaveda and has thus its origin in the Vedas. It has survived through two sets of original authentic texts each consisting of three encyclopedic texts, viz. (i) *Vṛhattrayī,* i.e. the three large treatises—*Caraka saṃhitā, Suśruta saṃhitā,* and the *Saṃhitās* of Vāgbhaṭa; and (ii) *Laghutrayī,* i.e. the three small books namely, *Mādhava Nidāna, Śāraṅgadhara saṃhitā* and *Bhāvaprakāśa.* Originally written in Sanskrit, these texts are in the form of encyclopedias dealing with all dimensions of life, health, diseases and their treatment. The approach is essentially philosophic, holistic and humanistic. Ayurveda is more a life- and health-oriented system than a disease and treatment-oriented one. It presents a total life science and visualizes the total health of a total human being in a holistic way.

Ayurvedic medicine is eight-fold (*aṣṭāṅgika*). During the Classical Age of India (4th to 8th century, A.D.) Ayurveda was practised through its eight well developed broad clinical specialities, namely *Kāyacikitsā* (Internal Medicine), *Śalya Tantra* (Surgery), *Śālākya Tantra* (Ophthalmology and ENT), *Kumārabhṛtya* (Paediatrics, Obstetrics and Gynaecology), *Agada Tantra* (Toxicology), *Rasāyana* (Geriatrics and Nutrition), *Vājīkaraṇa* (Virility), and *Bhūta Vidyā* (Psychiatry and Demonology). This indicates that Ayurveda was already a fully developed medical science even in those days, besides its broad based psycho-social and life science aspects.

KĀYACIKITSĀ: ITS NUANCES

Of the eight branches of Ayurveda, *Kāyacikitsā* is the foremost and has continued to be dynamic down the ages, as it would be obvious from the presentation and discussion of the concepts that are given below. Though the antiquity of the roots of Ayurvedic knowledge goes back to the pre-Vedic period, the main science of life under the title of

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Ayurveda and its medicine appears to have developed during what is known as the *Saṃhitā* period when the authors of the Ayurvedic classics evolved a viable biological basis of Ayurveda as well as its clinical medicine and therapeutics in a rationally sound and systematic manner. This is evidenced by the emergence of the theories of *tridoṣa, saptadhātus, agni , āma, srotasa, vyādhi vijñāna* and diagnostics. Besides, there is the unique concept of pharmacodynamics of natural drugs in terms of *rasa–guṇa–vīrya–vipāka–prabhāva,* etc. The hallmark of such developments was the emergence of systemic medicine which flourished as *Kāyacikitsā* for over a thousand years and remained a living tradition even during the dark period of our history.

Kāyacikitsā is the discipline which deals with systematic *sarvānga samsṛta* diseases which involve the whole organism. The word, *kāya,* refers to the life process as a whole. *Agni, srota,* and *prāṇa* are the *sarvānga saṃsṛṭa* entities in the living body. Hence the term, *kāya* corresponds to *agni, srota* and *prāṇa-vyāpāra* as a whole. Besides, the word *kāya* is also interpreted in such a way (k= *kapha, a= agni* or *pitta, y = gati* or *vāyu*) as to correspond to the total *tridoṣa-vyāpāra* which is the integrated component of *prāṇa* phenomena. The word *kāya,* is also derived from the Saṃskrt root *'cin cayane'* meaning to select, to digest, to assimilate, to utilize, etc., all of which being the attributes of *agni,* with the result that often *kāya* is treated as a synonym of *agni* . In Ayurveda, the disorder of *agni* is considered as the main factor responsible for the causation of all systemic diseases (*rogāḥ sarvépi mandégnau*) according to Vāgbhaṭa.

Thus, except a few clinical problems related to localized pathologies like certain surgical and gynaecological diseases, all problems of health and disease, their prevention, diagnosis and treatment fall into the realm of *Kāyacikitsā* which indeed is a unique approach to the understanding of health, causes of ill health, the phenomenon of disease and diagnostics. The entire approach is holistic and restorative. Health is considered as a state of balance and homoeostasis, while a disease results due to the loss of homoeostasis or imbalance. *Kāyacikitsā* attempts first to eliminate the cause of the disease (*nidāna parivarjana)* and strengthen the body to allow self-cure by the restoration of balance or *dhātu sāmya* i.e. *prakṛti sthāpana*. Ayurvedic texts describe in detail the causative factors which may initiate vitiation of *doṣas* or *dhātu vaiṣamya*, the sequence of events taking place in the evolution of a disease, its manifestations, classification and methods of diagnosis, followed by approaches to the management of a patient. The treatment procedure of the sick consists of the elimination of the cause of diseases, purificatory procedures as well as palliative therapies with the help of natural dietetics and disciplined lifestyle prescriptions.

HOLISTIC APPROACH

It should be emphasized that Ayurveda advocates a complete promotive, preventive and curative system of medicine. There is no denying the fact that the knowledge and wisdom about all aspects of medicine available in Ayurvedic classics are extensive and rich. It is really intriguing to think as to what were the approaches, methods and tools which were used to discover and formulate such an advanced science. Certainly these were not due

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to crude empirical methods. The methodology would definitely have been intuitive, peripheral, experiential and tested by logic. Ayurveda, like all other systems of ancient Indian learning, made discoveries through the most subtle methodology, namely, the *prāmaṇas, i.e.,* (i) *pratyakṣa* (direct perception), (ii) *anumāna* (logical inference), (iii) *āptopadeśa* (verbal and authentic documentary testimony), and (iv) *yukti* (experimental evidence). It should be noted that the pathways of Ayurveda and those of contemporary modern medical sciences have different approaches. The obvious distinctions between Ayurveda and western medicine are as follows:

(i) Ayurveda is essentially an ***experiential science*** in contrast to modern medicine which is an ***experimental science***; (ii) it has a holistic or totalistic approach in contrast to modern medicine which is analytical in its approach; and (iii) it is a function-oriented science while modern medicine is structure- or organ-oriented. As a result, Ayurveda looks at the whole organism as a total indivisible being which has to function as a *whole* and to exist as a *whole.*

Ayurveda is based on the laws of Nature and its theory of *Loka-puruṣa—sāmya,* i.e. macrocosm-microcosm continuum, constitutes the most important principle of Ayurveda. An individual human being is the miniature replica of the universe. The individual and the universe are both essentially *pañcabhautika* (constituted of five 'elements') The individual *(Puruṣa)* and the universe *(Loka)* remain in constant interaction with each other in order to maintain bilateral normalcy and homoeostasis. This exchange follows the law of *sāmānya* and *viśeṣa* (homologous vs heterologous) based on the simple principle that similar/ homologous matter augments the similar, while dissimilar/heterologous matter decreases or depletes it. The interaction and exchange between *Loka* and *Puruṣa* continues in a natural way as a person breathes air, drinks water, and consumes food articles available in nature. So long as this interaction is wholesome and optimum, the individual is in optimum health. When this harmonious interaction breaks, a disease-state appears. Hence, the main principle of treatment of a disease is nothing other than to restore harmony between the *Loka* and *Puruṣa,* as well as to restore normalcy in the balance of *pañcamahābhūtas* in the body and mind with due homoeostasis.

Ayurveda regards life *(āyu)* as a four dimensional entity comprising *śarīra* (physical body), *indriya* (senses), *sattva* (psyche) and the soul or *ātma,* the conscious element. Thus, the individual life is a comprehensive psycho-physico-spiritual unit which is extremely dynamic and is in constant interplay with the cosmos.

THE THEORY OF TRIDOṢA

The five physical constituents i.e. the *mahābhūtas,* are physical entities which are transformed into the three major biological components of a living body, called *tridoṣa* i.e. *vāta, pitta* and *kapha.* The entire bodily function is explained in terms of these *doṣas.* They are called *doṣa* because of their inherent tendency to get vitiated and to vitiate each other. *Vāta* is the biological product of the predominance of the elements, *vāyu* (air) and *ākāśa. Pitta* is the product of the predominance of the element *agni* (fire) while *kapha* is

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formed by the elements, *pṛthvī* (earth) and *ap* (water). The *tridoṣa* doctrine explains human physiology in a unique, holistic manner. Apparently the entire human body consists of a mass of solid substratum with an intensive interplay of biochemical activity and an energy pool of motion and movement. These three aspects co-exist in a predetermined proportion and function in a manner complementary to each other in the interest of the overall function of the entire organism as a whole in spite of their opposite properties and functions. Of the above, the solid substratum of the body is called *kapha,* the chemical moieties are the *pitta,* and the motive energy aspect is *vāta* of the life system. The existence of the three *doṣas* can be felt not only in the gross body in its entirety, but can also be traced to the molecular level.

The relative proportion of the three *doṣas* is very important. The genetically determined relative proportion of these three within normal range is called *doṣa prakṛti.* This is responsible for determining the total personality make-up representing the sum total of his or her physique, physiology and psyche. Depending upon a variety of pre-natal factors, there develops a particular pattern of relative preponderance of one or the other of the three *doṣas* in an individual's genetically determined constitution. Thus *doṣa prakṛti* is important for understanding human life, health, disease, disease-susceptibility, preventive and promotive health care as well as the requirements of treating a patient. The *pañcamahābhūtas* are represented in the psyche of an individual in terms of three *guṇas* of the *manas* or mind, viz. *sattva, rajas* and *tamas. Ākāśa* is represented in *sattva guṇa,* vāyu and *tejas* in *rajo guṇa,* while *pṛthvī* and *ap* are represented in *tamo guṇa* . The last represents mass and inertia, while *rajo guṇa* denotes dynamics and activity, and *sattva* is the state of complete balance. In consonance with the genetically determined relative preponderance of one or the other of the three *guṇas,* the psychic make-up of an individual varies. This variation is categorized as three major *manas-prakṛtis* which are further subdivided into sixteen subtypes or traits.

NATURAL SELF-CURE

Ayurveda has also propounded an important theory of natural self-cure or spontaneous healing called the *Śvabhāvoparamavāda,* considering that the human body is inherently endowed with an innate power of self-defence and spontaneous healing against injury or disease. In other words, the cause of diseases ceases by nature, the body heals itself and natural cure follows after every injury. The role of medicine is only to assist this natural process.

Ayurvedic medicine is essentially promotive and preventive in approach. However, it also provides a comprehensive system of curative medicine for the treatment of the sick by adopting, as stated earlier, a holistic approach. In accordance with the four–dimensional concept of *āyu* or life, it also expounds a four–dimensional definition of health. Suśruta, one of the classic authors on Ayurveda, defines health as *svāsthya,* i.e., the state of an individual in *sāmya* or balance of the three *doṣas,* the thirteen *agnis,* the seven *dhātus* and the *malas,* i.e., the state of total biological equilibrium besides being in the harmonious state of sensorial, mental, emotional, and spiritual well-being (*prasanna*).

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Ayurveda, therefore, presents the most complete definition of health. Besides, Ayurvedic texts describe a comprehensive schedule of health regimen for the preservation of health, and a code of health-conduct popularly known as *svasthavṛtta* which includes the conduct for sound health during the day *(dinacaryā)*, sound health during the night (*rātricaryā*), and in relation to various seasons (*ṛtucaryā)*. Details about lifestyle, diet, exercise, personal and social hygiene *(sadvṛtta),* have also been described, along with extensive information on nutrition and dietetics. In addition, Ayurveda gives a detailed exposition of the periodic biological purificatory measures, and the consumption of restorative remedies called *rasāyana* to achieve *vyādhikṣamatva* or resistance against disease.

The object of curative treatment in Ayurveda, it may be reiterated, is to restore the balance of *doṣas* because, according to this medical system, a disease is but a state of imbalance of the *doṣas* or the loss of equilibrium or of homoeostasis. The therapeutic attempt in this direction is made by (i) augmenting the weakened *doṣa;* (ii) decreasing the increased *doṣas;* and (iii) preserving the normal ones. This is accomplished through the administration of appropriate diets, as well as drugs and activities based on the principle of *sāmānya* and *viśeṣa* (homologous vs heterologous). According to this principle, a similar or homologous material received from outside enriches the similars in the body, and a dissimilar or heterologous material depletes its counterpart in the body. In Ayurveda this principle is considered to be the fundamental basis of all actions, natural or artificial, and as the law of nature which a physician keeps in mind while treating a patient.

Ayurveda describes three mainstreams of therapeutic intervention which may be complementary to each other, though most of the time they are used specifically for certain categories of ailments. These are : (i) *daivavyapāśrayacikitsā,* (divine therapy); (ii) *yuktivyapāśrayacikitsā* (rational therapy); and (iii) *sattvāvajaya* (psychotherapy). The first therapy is specially indicated in the case of diseases caused by the actions of past life (*karma*) and where no definite acquired cause of the disease is traceable nor is any rational therapy effective. The divine therapy is often practised in tune with astrology, stars, gemstones, incantations, oblations, worship and the like. This is a kind of astro-therapy since this is neither psychotherapy nor is it of any biological significance.

The second, i.e., the rational Ayurvedic treatment (*yuktivaypāśraya*) is carried out in two parts: (i) *samśodhana* or purificatory therapy; and (ii) *samśamana* or curative treatment. The former is also popularly known as *pañca karma* (see below) for purifying the body from the gross to the subtle levels and also cleaning the channels of the body so as to enable through them a free flow of nutrients and metabolites or medicaments. The living human body consists of innumerable channels called *srotas.* Due to ill health, wear and tear, these channels which are traceable down to the level of pores of the cell membranes and also at sub-cellular level, get blocked and become sluggish. Ayurveda advocates that these channels should be cleaned by *samśodhana* (purificatory) measures in order to strengthen the organism to heal by itself or undergo spontaneous recovery, and also to enable the medicaments to reach the target sites more easily. This measure is considered to be a prerequisite for all kinds of medication and therapeutic interventions. A number of procedures have been described for *samśodhana karma,* which is again practised in two forms: (i) External purification by way of oleation, fomentation and

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massage where a therapist uses oil bath, steam-heat and physical pressure or massage, as the means of treatment to soften and mobilize the *malas* or impurities. External purification measures liquefy the internal impurities and push them into gross channels, from where they get easily excreted or expelled with the help of major internal purificatory procedures. Hence these measures are considered as the preparatory ones for the subsequent major internal purificatory therapies. (ii) Internal purification itself is the major intervention and consists of *vamana* (emesis), *virecana* (purgation), *anuvāsana basti* (oleus enema), *āsthāpana* (non-oleus enema) and *śirovirecana* (snuffing). Together they are popularly known as *pañca karma* or five-fold therapy.

In principle, the purificatory process is followed by specific curative treatment that consists of rationally planned diet, drugs and lifestyle. While formulating such a scheme, a physician keeps in view the nature or constitution (*prakṛti)* of the patient and the components of morbidity *(vikṛti),* namely, the pattern of vitiation of *doṣas, dhātus, agni,* etc. He also takes into consideration the *pañcabhautik* composition of drugs and diets, including their *rasa, guṇa, vīrya, vipāka* and *prabhāva,* and follows the principle of homologues vs heterologues.

THE DISEASE AND AETIOPATHOGENESIS

Ayurveda regards the state of not being well as unpleasant or misery (*duḥkha*) i.e., disease, and in accordance with the four-dimensional concept of *āyu*, the disease is also considered to be four-dimensional. Diseases are classified into three major categories : *ādhibhautika, ādhidaivika* and *adhyātmika.* Although the disease-state is predominantly a condition of imbalance of the *doṣas, dhātus* and *malas,* in final presentation it is notably influenced by the seat (*adhiṣṭhāna*) of their vitiation.

The Hindu concept of *karma* and the diseases that occur as a result *(karmaja vyādhis)* as well as the time factor or rhythm associated with them have been discussed in the earlier chapter 2. Another generic cause of disease is *prajñāparādha* which renders an individual susceptible to certain diseases due to his lowered immunity, and decreased mental stamina as well as perceptual ability. Ayurveda has also explained the onset of diseases due to the state of stress and the lack of an individual's adaptation.

Asātmyendriyārtha saṃyoga is the next generic cause of disease. *Ayoga, atiyoga,* and *mithyāyoga* of the sensory objects create a state of stress which leads to a disorder directly or renders an individual prone to different morbidities due to lowered immunity, adjustability, and adaptability.

The Ayurvedic classics describe in detail the subtle mode of sensory perception according to the theory of *pañcamahābhūtas* (five elements) and *pañcatanmātras* (five subtle states). A five-phase process of perception of the specific objects by the five senses or *indriyas* is called *indriya pañca pañcaka* (*indriyārtha, indriyādhiṣṭhāna; indriyadravya; indriya sattva* and *indriyabuddhi)*. The final perception is processed by the *sattva,* the mind. An object (*indriyārtha*) has to pass through all the above phases before it is transformed into an observation or perception i.e. *indriyabuddhi,* the quality of which depends on the quality of the object. An unwholesome object produces unwholesome

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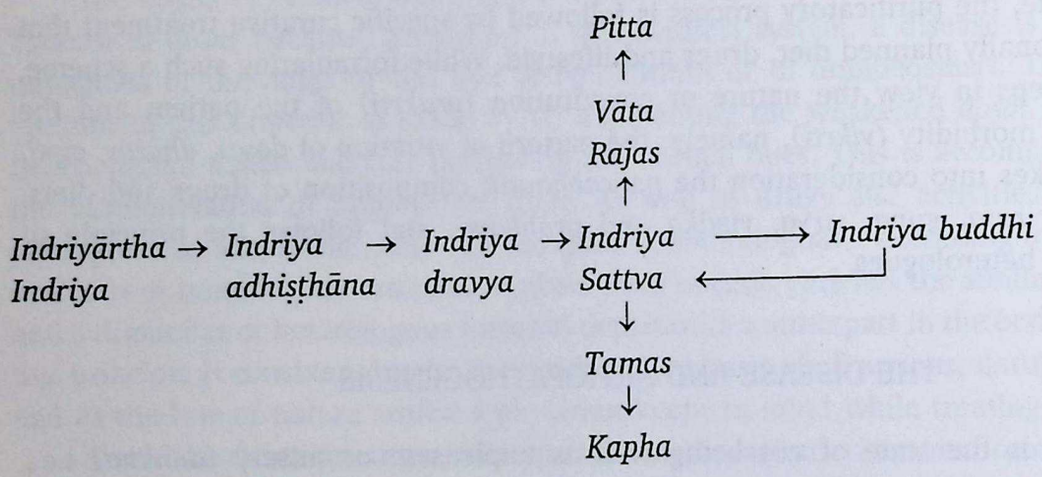
buddhi which, in turn, elaborates its psychosomatic influence accordingly. Hence the *ayoga, atiyoga*, and *mithyāyoga* of *indriyārthas*, or in other words, the inappropriate and perverted contact of sensory objects, precipitates into a stressful situation or sensation which leads to a disease. This age-old concept holds true even today and has gained greater relevance with the emergence of newer concepts of stress diseases, which are also described as informational disorders because of the key role played by the informational input to the organism through the sensory apparatus.

Schematic presentation of Sensory Objects and Disorders



The term, *samprāpti,* in Ayurveda, refers to phenomena of the pathogenesis precipitated by way of the aggravation and vitiation of *doṣas,* the pattern and nature of which would be according to the aetiological factors responsible for the particular vitiation of *doṣa*. When the *doṣas* find a suitable defective or weakened part or organ of the body, they localize and stagnate, and thus find an opportunity to interact with the local tissues or *dhātus*. The *dhātus* are also known as vitiable factors (*duṣyas)*. The interaction between the *doṣas* and *dhātus* is the actual disease process, and such an interaction leads to the development of a special set of clinical manifestations which are the joint product of vitiated *doṣas* and *duṣyas* as well as the vitiated set of organs (*adhiṣṭhāna*) involved. The Ayurvedic texts describe vividly the sequence of events, viz. *nidāna* (cause), *samprāpti* (pathogenesis), *pūrvārūpa* (appearance of prodromal features) and *rūpa* (appearance of main symptoms and signs of a disease).

Kriyākāla

The *Suśruta saṃhitā* describes precisely the sequence of events taking place during the evolution of a disease, depicting six distinct stages of pathogenesis. These are classically termed *ṣaṭkriyākāla,* to denote that these six are the opportune time-occasions to institute the needed therapeutic intervention. The concept of *kriyākāla* presents a unique but holistic way of predicting the stages of progression of a pathology from a reversible pre-clinical stage to a manifest clinical disorder, which would in turn be open to further advancement of the disease with the complications of irreversible character. The

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fundamental philosophy behind the concept of *kriyākāla* is to advocate an early diagnosis and appropriate intervention in order to reverse the disease process. The six *kriyākālas,* according to Suśruta, are: (i) *Sañcaya*—accumulation of *doṣas*; (ii) *Prakopa*—vitiation or aggravation of doṣas; (iii) *Prasāra*—spread of vitiated *doṣas*; (iv) *Sthāna samśraya*—localization of vitiated *doṣas* at defective sites; (v) *Vyakti*—manifestation of the disease; and (vi) *Bheda*—further advancement and complications.

***Accumulation of doṣas (Sañcaya)*:** This is the first stage in the evolution of a disease. At this stage the accumulation or the increase of *doṣas,* occurs in their own normal sites. These accumulating *doṣas* though increased quantitatively, still remain qualitatively normal and intact in their normal site. The patient may feel some symptoms at this stage, which are not those of a disease, but are of the increase in the concerned *doṣa,* the accumulation of which manifests itself differently in different seasons as well as in response to different kinds of foods, etc. This is a reversible condition and may recede to normalcy immediately after the withdrawal of its causative factor.

The actual pathognomonic accumulation of *doṣa*, however, is triggered due to *āmāvasthā* in the body that occurs owing to the slow digestive power (*mandāgni)*. The presence of *āma* renders the body metabolically slow and sluggish along with the varying degrees of blockade of channels of the body. The presence of *āma* in the body due to its antigenic/autotoxic nature also precipitates the production of many antibodies which again block the channels. This state of morbidity may be compared with the contemporary concept of the loss of membrane integrity and membrane pathology, which is considered as the sheet anchor of the pathology of many diseases as conceived in modern medical science. Membrane biology is regarded as the most vulnerable facet, and the integrity of membrane structures at all levels including the cell membranes and their pores (*srotāṃsi*) which function there dynamically, is the most important consideration in understanding the evolution of a disease. The Ayurvedic concepts of *srotasa* and *āma* causing *srotoduṣṭi* and *srotosāṅga* obviously refer to the above dimensions.

***Aggravation (Prakopa)*:** When an accumulated vitiation is allowed to continue, it starts getting qualitatively aggravated. At this stage, the *doṣas* are not only increased in quantity but also start becoming abnormal in quality, and are likely to spread within the body at any moment. Nevertheless, there are not still the actual features of any real disease. In a proper situation, this stage too is reversible. Ordinarily, *prakopa* follows *sañcaya* (accumulation) and the quantitative increase of a *doṣa* precludes its qualitative vitiation. But in situations of acute and sudden onset of a disease, a *doṣa* may undergo *prakopa* even without passing through accumulation *(acaya prakopa),* such as in the case of acute sudden infections, and accidental injuries.

***Spread of doṣas (Prasāra)*:** If the causative factors are withdrawn, the second stage (noted above) recedes to normalcy; otherwise, the aggravated *doṣas,* in the course of the progression of their pathogenesis, begin to spread to different parts of the body, leaving their usual normal sites. In the beginning, this spread follows a particular pattern ordinarily in accordance with the pattern of *traya roga mārga*. Subsequently, however,

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when the spread is advanced and massive, there is no pattern. The exponents of Ayurveda describe two forms of the spread of *doṣas:* one is quantitative, and the other, qualitative. In the former situation, the spread of *doṣas* is propelled more because of their massive increase in quantity in the same way as the over- flooded water of a river breaks the dam and spreads all over. This usually happens after the accumulation of *doṣas.* In the other condition, there is not much increase in the quantity of the *doṣas,* but their deleterious quality is highly altered leading to frothing, bubbling, biochemical effervescence, etc. which overflow from the natural site of a *doṣa* to the surroundings in the same way as the sugar solution with fermenting enzymes placed in a pot, undergoes active fermentation and bubbles out to overflow. This can happen after *acaya prakopa.*

In the stage when the pathogenesis starts taking an irreversible turn *(prasarāvasthā),* a patient still presents symptoms and signs of aggravated *doṣa* but not of a particular disease. However, as the *doṣas* have already started spreading, there would be a wandering pattern of symptoms too, which may not be in accordance with the specific sites of a *dosa,* and the chances of their alleviation would have ceased. Nevertheless, if the spreading *doṣas* do not find an appropriate morbid site for their localization and if the causative factors are withdrawn simultaneously, there would still be some chances of the reversal of the *kriyākāla.*

Localization (Sthāna saṃśraya): The vitiated *doṣas,* in the course of their spread, may find a morbid defective or weak site in the body for their localization This is known as *sthāna saṃśraya* and is considered as the most important and eventful step in the genesis of a disease. Availability of a weak or pro-defective site is essential for localization. Such a defect is classically termed a space defect (*khavaiguṇya*) . This situation may be due to a pre-existing genetic weakness, or a defect of a particular part or organ of the body, from birth. This may also be because of a defect or damage of an organ due to previous disease which had left the concerned organ permanently weak or defective even after clinical recovery.

It is the space defect that determines the seat of localization of *doṣas* and also, in this way, the exact nature of the resulting disease and its manifestations. It is generally observed that, in spite of a similar stressful situation, different individuals develop different diseases. In some persons, stress produces a heart attack, while in others, hypertension or asthma or in yet others, it may produce peptic ulcer. This difference may be, on the one hand, due to the role of psychosomatic constitution (*prakṛti)* of the person and, on the other, due to the nature of the pre-existing space defect predisposing specific localization of vitiated *doṣas* during *kriyākāla,* i.e. pathogenesis.

Localization is the stage of morbidity process when the *doṣas* would get an environmental opportunity to remain in contact with the local tissue or *dhātus* to vitiate them further through interaction. It is this interaction in a given organ site that is responsible for producing signs and symptoms of a disease. It is for the first time during localization, the fourth *kriyākāla,* that some symptoms of a disease start manifesting themselves, despite the fact that the disease is not yet in a fullgrown form. But this is the stage of the birth of a disease (*vyādhijanmakāla*). The symptoms which appear during this stage are considered as the prodromal ones since, unless the *doṣa-duṣya-sammūrchanā* is

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complete, the characteristic features of a disease would not fully manifest themselves. During this process the signs and symptoms appear as an array of transient symptoms (*pūrva rūpa)* and subside when the really characteristic features manifest themselves consequent upon the completion of morbid reaction.

***Stage of manifestation* (*Vyakti*):** The disease attains its fully grown form at this stage when its characteristic stable clinical features or *rūpa,* appear. This stage is considered as the stage of *Vyādhidarśankāla*. The characteristic features of a disease would be in accordance with the pattern of the interaction (*sammūrchanā*) of *doṣas* and *duṣyas,* which is ordinarily of two types: (i) The nature of the mixing of *doṣa* and *duṣya* is not intensive and hence their involvement in a particular disease continues to maintain some degree of their identity in the resultant disease. Therefore, clinically it is not difficult to identify as to which could be the causative component *doṣas* and *duṣyas* in the disease. One can easily categorize these diseases as *vātaja, pittaja, kaphaja, dvandvaja, sannipātaja,* etc. This is called *prakṛti- sama samaveta samprāpti* and it produces what are called *prakṛti sama samaveta lakṣaṇas* or manifestations. (ii) In contrast to the above in *vikṛti viṣama samaveta saṃprāpti* the *doṣa-duṣya* mix up is more intensive and of complete nature with the effect that the resultant disease is a completely new product and does not allow the identity of individual *doṣas* and *duṣyas* to manifest themselves in the disease. In such a situation, clinically it is not easy to identity the *tridoṣika* nature of the disease nor its *duṣyas*, since they would have lost their identity in the disease .Usually in such situations, the diseases are not classified in terms of *vāta, pitta, kapha,* etc; rather they are given new clinical or organ-based names such as *mūtrajaṭhara, asthila, mūtrotsaṅga,* etc.

***Chronic stage and complications* (*Bheda*):** *Bheda,* the sixth and the last stage of *kriyākāla,* is the advanced stage of a disease when its *bhedas* or types are clearly manifest. The word *bheda,* also signifies the phenomenon of bursting of a disease into complications, leading to the development of other associated ailments, besides referring to the chronicity of a disease. This is the stage when the disease is diagnosed more by its complications, and its management involves the treatment of the associated complications along with the main disease.

AYURVEDIC DIAGNOSTICS

Ayurveda describes elaborate methods of case-history and clinical examination with certain specific approaches. The following merit special mention in this connection:

(i) Ayurveda lays special emphasis on intimate doctor-patient relationship or high quality rapport in order to achieve the necessary understanding of a patient and his ailments. Caraka appropriately states that 'unless a physician succeeds in entering the innermost being (*antarātmā)* of his patient in the light of the lamp of his (the physician's) knowledge and wisdom, he cannot treat him' (*Caraka, vimāna,*4:19).

A successful physician has to be not only well trained and knowledgeable but also adequately wise, intelligent, transparently sincere to, and in close rapport with his patient.

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Only these fundamental qualities can help him to arrive at a correct diagnosis of the disease and to prescribe the appropriate line of treatment.

(ii) Ayurveda stands for extensive and elaborate clinical examination. It does not speak of any short-cut method as is the trend in modern times to use instrumentation technology for quick diagnosis. Some Ayurvedic physicians claim to make a diagnosis only by pulse reading without the help of any other clinical examination. Although this could be true in the case of some physicians, the classical Ayurveda, in principle, does not advocate such a short-cut method. As pointed out already, the Ayurvedic diagnosis in principle is a qualitative diagnosis, not in terms of the name of a specific disease, but it is an elaborately descriptive procedure to determine the nature of the disease and its aetiopathogenesis. As the objective of the diagnosis is elaborate, the methodology too has to be elaborate covering the comprehensive aetiopathological dimensions in a patient.

(iii) Another important aspect of the Ayurvedic clinical methods is the simultaneous dual approach of what may be called the *rogi-roga parīkṣā*. Ayurveda is the only system of medicine in the world which has conceived the idea of identifying the patient and the disease *together*. An Ayurvedic physician does not examine his patient only as a diseased entity but also as an individual human being with all his attributes including his constitution, temperament and life-style. A physician examines the *man* in his patient and the *health* in his diseased state. The important component of the entire diagnostic exercise is to assess and estimate the remaining health, (*avaśiṣta svāsthya)* of a patient. It is for this purpose that Caraka describes the tenfold examination (*daṣa vidha parīkṣā)*. After all, even in the diseased state, a patient would not have lost all his health and a part of his health would remain with him even during his disease. And it is this remainder of the health of the patient which is going to help him to recover from the disease on the principles of self-healing and spontaneous recovery (*svabhāvoparama vāda)* when supported by therapy and elimination of the cause of the disease (*nidāna parivarjana)*.

Thus the Ayurvedic clinical method is broadly divided into two parts:(i) *rogi parīkṣā* (examination of a patient) and (ii) *roga parīkṣā* (examination of disease).

The fundamental message of this approach emphasizes that a patient is not all the disease; he should be regarded as a human being with some curtailed health and then, a diseased subject. Hence a physician should evaluate his patient with respect to the three dimensions, viz. (1) man and his constitution; (2) the remainder of his health; and (3) his disease. Such a comprehensive approach is rarely seen in occidental medical science.

(iv) The Ayurvedic classics and the subsequent texts have provided a detailed account of the science and philosophy of clinical medicine in Ayurveda using many conceptualized terminologies. The entire context may be summarized and categorised for easy and practical understanding as mentioned below.

As stated earlier, the fundamental objective of clinical examination in Ayurveda is twofold aiming at evaluating (i) the strength of the *patient;* and (ii) the nature and strength of the *disease*. All aspects of clinical examination are directed towards these two objectives. It is because of this twofold objective, a unique character of Ayurveda, that it has evolved a comprehensive technical methodology and a broad clinical examination system.

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COMPONENTS OF CLASSICAL CLINICAL METHODOLOGY

Objective of examination	*Method of examination*	*Seat of examination*
1. *Āturbala pramāṇa vijñanāya* (to know the strength of the patient)	1. *Dvividha parīkṣā* (two methods)	1. *daśa sthāna* (ten places) *1. Prakṛti* *6. Sātmya* *2. Vikṛti* *7. Pramāṇa* *3. Sāra* *8. Āhāra Śakti* *4. Samhanana* *9. Vyāyāma Śakti* *5. Sattva* *10. Vaya*
2. *Vyādhi bala pramāṇa vijñānaya* (to know the strength of the disease)	2. *Trividha parīkṣā* (three fold methods) 3. *Caturvidha parikṣā* (fourfold method) 4. *Pañcavidha paṛikṣā* (Five fold method) 5. *Ṣaḍvidha Parikṣa* (sixfold method) 1. *prasaṇa/nidāna pañcaka* + 2. *pañcendriya ṣaḍaṅga parīkṣā* a) *ṣaḍaṅga parīkṣā* b) *trayodaśa srotasa parīkṣā*	II *aṣṭa sthāna* (eight places) *1. Nāḍi* *5. Śabda* *2. Mūtra* *6. Sparśaṃ* *3. Mala* *7. Dṛk* *4. Jihvā* *8. Ākṛti*

As for the tools or techniques of clinical examination, Ayurveda has a fundamental approach which has been adopted from Indian philosophy and logic, the details of which have been given in chapter 2.

Examination of a patient

Ayurveda has its well formulated methodology of examining a patient. The three methods (*trividha parīkṣā)* comprise verbal or textual testimony, direct observation, and inference.The fourth one is known as *Yukti pramāṇa*, introduced by Caraka, by which an investigator employs additional experimentation to gather evidence to prove or disprove information in a rational manner. These four methods of examination are called *caturvidha parīkṣā*. There is also the *parīkṣā*, i.e., the physical examination of a patient through the five senses. A physician utilizes his own senses i.e. *(pañca jñānendriyas)* to examine the

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body of his patient through inspection, palpation, auscultation etc. He uses his sense of smell and taste too but remotely and indirectly. Even in modern medicine, the physical examination of a patient is done with the same tools. However, a contemporary doctor may sometimes uses some additional aids and equipments to accelerate the function of the senses, such as the stethoscope, endoscope and microscope; but essentially all such examinations are nothing but *pancendriya parīkṣā,* which is also referred to as *pañcavidha parīkṣā* that is in the realm of direct perception (*pratyakṣa pramāṇa*).

The foregoing five physical methods and interrogation *(praśna)* or preparing a case-history of a patient through questioning is known as *ṣaḍvidha parīkṣā.* The method of interrogation is the most fundamental method of diagnosis and continues to be so even in modern medicine. The Ayurvedic interrogation is intended to elicit information about the main complaints with their duration, family and personal history, history of past illness as well as present illness including its earlier cause, its present form and related aspects. All of these help in understanding the natural history of the disease and its relationship with the personality and environment of a patient. The interrogation is carried out by a physican who should consider the patient as his own dear true (*āpta*) friend.

Ten Point Examination

Caraka has stipulated the most popular and practical ten points of examination *(daśa vidha parīkṣā)*. They are: (i) Constitution (*prakṛti)*—psycho-physical variation or the nature of the body; whether it is *vātaja, pittaja* or *kaphaja* in a balanced or imbalanced state; psychic or mental nature and their various modes; (ii) Disease susceptibility *(vikṛti)*; (iii) Tissues *(dhātus)* quality (*sāra*); (iv) Compactness of the body/ build *(saṃhanana)*; (v) Anthropometry (*pramāṇa)*; (vi) Adaptability *(sātmya)*; (vii) Mental stamina (*sattva)*; (viii) Digestive power or appetite and digestion *(āhāra śakti);* (ix) Exercise endurance *(vyāyāma śakti);* and (x) Age and the rate of ageing *(vaya and vayīkaraṇa)*.

Among these, the *prakṛti* of a patient is the most important; hence it is given the first place in the above list.In fact, some physicians examine only the *prakṛti* of a patient among the *daśavidha parīkṣā.*

Examination of Disease

The examination of a disease is generally carried out in two parts as classically described in Ayurvedic texts: General examination by what is known as *aṣṭasthāna* or *aṣṭavidha parīkṣā* of eight well chosen points of the body which represent the *whole* body, utilizing the tool of six point examination (physical examination through five senses and interrogation). These eight classically chosen points of examinations which have been described specially by the medieval Ayurvedic authorities, like Yoga Ratnakar Bhāva Miśra and Sāraṅgadhara, are:

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(a) *Nāḍī*-(pulse reading); (b) *Mūtra* (urine examination); (c) *Mala* (stool examination); (d) *Jihvā* (examination of tongue); (e) *Śabda* (the voice and speech); (f) *Sparśa* (skin); (g) *Dṛk* (the eyes); and (h) *Ākṛti* (the face).

A careful examination of these eight points does provide a comprehensive understanding of the body and its internal functions, since each one also represents the body, as highly sensitive clinical indices for understanding the manifestation of any disorder or disease in the body as a whole. It may be noted that there can be no better choice of effective survey points of a patient's body and its functions than these eight. It is for this reason that sometimes the examination of eight points only is considered as the full examination of a patient. Of them, *nāḍi* or pulse is the most important. Hence it is listed as number one. Some physicians claim that they can make a complete diagnosis only by pulse reading. However, as pointed out earlier,this is not the spirit of classical Ayurveda.

Besides the general examination of a patient as mentioned above, a physician is expected to undertake a systemic examination of a patient. For this purpose, Suśruta has described the examination of six parts of the body (*ṣaḍanga parīkṣa*)—head and neck, trunk, and the four extremities. There are certain major (*srotas)* channels or physiological systems located in each of these six parts of the body. A physician should clinically examine each channel/system systematically through each one of the six parts of the body. Caraka has described 13 major channels (*srotas*) or systems. Each one of them is linked with its main organ, i.e., the one from which the channel (*srotas*) or its seat (*mūlaṃ*) or the manifestation of the disorder originate.

The scope of and approach to the examination of the ten points are summarized below:

Nature (prakṛti): The nature of an individual refers to the genetically determined physical and mental make-up. This is determined in relation to what is known as the *tridoṣa* and *triguṇa*. The concept of *prakṛti* includes *tridoṣas* viz. *vāta, pitta, kapha,* and the three *guṇas* i.e. *sattva, rajas* and *tamas* in the psycho-physical constitution of an individual. It is the range of proportion of *tridoṣas* that determines the overall physique, physiology and psyche of an individual. In respect of the mental nature (*mānas prakṛti),* the relative proportion of the aforesaid *triguṇas* determines the varieties of human temperament and emotions alike. The important features of the varieties of the vitiated physique (*deha prakṛti*) as well as the mental nature (*mānas prakṛti*) have been succinctly described in Ayurvedic texts.

Morbidity (vikṛti): In the context of tenfold examination, it is advisable to limit this part of the examination to the evaluation of disease-susceptibility of a person. By considering the history of his past and present illness, a physician can estimate and even predict the possible susceptibility of an individual to different ailments. Such an information may also prove useful for predicting diagnosis as well as prognosis.

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Thirteen channels / systems and their main organs (*Mūlam*)

Part of the Body	*System*	*Main organ (Mūlam)*
(*Aṅga*)	(*Srotas*)	(*Mūlam*)
Śirogrīva (head and neck)	1. *Manovāha srotas*	*Śirṣa-tālu* (brain)
	2. *Udakavāha srotas*	*Tālu, kloma* (throat)
Antaradhi-uras (trunk; chest)	3. *Prāṇavāha*	Heart *mahāsrota*
	4. *Rasavāha srotas*	Heart, major blood vessels
Antaradhi-udara (trunk—abdomen)	5. *Raktavāha srostas*	Liver, Spleen
	6. *Annavāha srotas*	Stomach and small intestine
	7. *Purīṣavāha srotas*	Colon, rectum
	8. *Mūtravāha srotas*	Urinary tract
	9. *Śukra / Ārtavavāha srotas*	Testes and other reproductive organs.
	10. *Medovāha srotas*	*Brikka, Vapā vahana* (kidneys and omentum)
Śākhā (four limbs)	11. *Māṃasavāha srotas*	Muscles
	12. *Asthivāha srotas*	Bones
	13. *Majjāvāha srotas*	Marrow
	14. *Svedavāha srotas*	Hair follicles

***Qualities* of *dhātus* and psyche (sāra):** The examination called the *sāra parīkṣā* is carried out to determine the qualities of seven *dhātus* and the psyche—in all eight components. The essences *(sāra)* of seven *dhātus* (*rasa* or chyle, blood, tissues, fat, bone, marrow and *śukra* or semen) and of *sattva* or psyche are examined and labelled in terms of their relative quality: superior (*pravara*), medium *(madhyama),* and inferior *(avara)*. Such a qualitative examination helps a physician to arrive at his conclusion with regard to the overall quality of a patient's psycho-biological health and make- up. The *pravara* is indicative of good health, immunity and better prognosis while the *avara* suggests poor health, low immunity and poor prognosis.

Compactness (saṃhanana): The compactness of the body reflects the quality of its overall build. A well balanced or proportionate body build is an indicator that it is endowed with good health, immunity and better prognosis during any disease. *Saṃhanana* is a qualitative assessment of the body frame and is described also in terms of superior, medium, and inferior (*pravara, madhyama, and avara* respectively).

Anthropometry (pramāṇa): The Ayurvedic texts describe in detail the measurements of all body parts in a person's own finger breadth, i.e. *aṅgula pramāṇa.*

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Stress sustenance (sātmya): The assessment of the ability of an individual, which allows him to survive in a hostile situation and to endure stress and altered circumstance is called *sātmya,* a comprehensive concept that embraces a wide range of psycho-biological and immuno–behavioural tendencies. However, for the routine examination for clinical purposes, a physician should assess it in terms of the qualities (*guṇa*) and the six *rasas* besides many other adaptable factors.

Mental stamina (sattva): Due to genetic reasons or the general up-bringing, different persons display different categories of mental stamina. An evaluation of mental stamina is also done to determine whether it is superior, medium or inferior in a person vis-a-vis his tolerance and adjusting capacity with respect to pain or odd situations. It is commonly observed that with a similar degree of painful pathology, a patient who has inferior mental stamina complains of a lot of pain and requires repeated doses of painkillers while, in the same situation, one who has superior mental power will not complain much and may continue without a dose of analgesic. A person who has a medium quality of mental stamina in the above situation feels pain, but easily adjusts himself when assured of it even without actual medication. Such information is very useful for a physician in managing patients by utilizing their mental stamina in their own interest, thus avoiding over medication.

Digestive (āhāra śakti): The *āhāra śakti parīkṣā* is used to determine the *agni bala* (digestive power) of an individual. It is examined through two aspects: (i) by his power or capacity to ingest, i.e., the quantity of food consumed— this is also related to his appetite; and (ii) by the power or capacity to digest. Thus by knowing the quantity of food which one is capable of eating, and how much one can actually digest, it is possible to estimate the total alimentary power which reflects the power of digestive *fire* (*agni*) of an individual. Such information is very useful while managing a patient because, if a physician is sure about the digestive capacity of his patient, he can plan the diet and nutrition for his patient more rationally and objectively, along with the therapy and medication. In this way the patient recovers from the disease and simultaneously regains his health. Moreover, the prognosis is always better in a case having superior digestive power.

Exercise (vyāyāma śakti): The ability or capacity of a patient to work and to do exercise is assessed by the measurement of exercise endurance which permits a physician to estimate the physical stamina of his patient. This is useful information as it facilitates the overall management of a patient whereby the physician can prescribe necessary in-bed or out of bed exercise and ambulation. This also helps in the simultaneous recovery and rehabilitation of a patient. The right types of exercise can be added to the prescription precisely if the exercise-endurance of the patient is known. Generally, the increase in the pulse rate, the rate of respiration, blood pressure, etc. (after a given quantum of exercise and the rate of reversal of these changes after rest) are taken as indicators of the exercise-endurance. The prognosis of a patient with superior exercise- endurance is always better.

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Examination of age:(vaya parīkṣā): This relates to the verification of the chronological age of a patient and the rate of his *vayīkaraṇa* or ageing. If a patient apparently looks more aged than his chronological age, it indicates a relatively rapid rate of his ageing process. Obviously such a situation is suggestive of a type of negative health, and the overall prognosis of such a patient would be inferior. He would need additional care with anti-ageing measures in addition to the treatment of the disease for which he would be seeking the main advice from a physician.

Eight point general examination in roga parīkṣā

Though the eight point examination of a disease also provides information about the *prakṛti* or constitution of an individual, it can be mainly used for an evaluation of a disease-state. For this reason, the texts state, *'rogākrānta śarīrasya aṣṭasthāna parīkṣeta* ; i.e., 'examine the eight points on the body of the sick'. These eight points in a diseased person reflect more the disease than the constitution because the disease finds these eight points as the most transparent ways for clinical manifestation. It may be noted that this type of examination is ordinarily conducted for *roga parīkṣā* (examination of the disease) and not for *rogi parīkṣā* (examination of the patient).

Pulse examination (nāḍī parīkṣā): The examination of pulse is an important method in contemporary Ayurveda although, as pointed out earlier, the classical Ayurvedic texts have not described this method. It would appear that it emerged as a major clinical method during the medieval period as is evident from its clear descriptions in the medieval texts like Yoga Ratnakar and *Bhāvaprakāśa*. Nevertheless, it is now recognized as an important item of clinical examination in all schools of medicine, since it provides an opportunity to a physician to give a healing touch to the patient and to gain sensitive rapport with him, besides the treasure of clinical information that he may get by palpating the pulse of his patient.

While examining the pulse, both the physician and the patient should sit in a relaxed basal condition. If either of them is tense, such tension will be transferred to each other and the tension may mask the basal clinical state. The elbow and the wrist of the patient should be slightly flexed and the physician should place his three fingers (index, middle and ring finger) on the radial pulse of the patient at the root of the thumb in such a way that the index finger is nearer to the patients thumb, while the ring finger is farthest away.

The physician palpates the pulse with all the three fingers separately as well as in combination, and tries to perceive the state of the three *doṣas—vāta, pitta* and *kapha*—with the index, middle and ring finger respectively. The three fingers are to be trained by experience to clinch the nature and the extent of the three *doṣas* through their perceivable attributes as revealed by palpation. A physician, if a beginner, learns and trains his different fingers to palpate the specific attributes of the three *doṣas*. It is presumed that the rate and rhythm of the pulse are controlled by *vāta* while the amplitude of the pulse is controlled by *pitta*. The volume of the pulse is the function of *kapha*. It is for this reason

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that a physician assumes or concludes that the index finger perceives *vāta* (rate, rhythm), the middle finger perceives *pitta* (amplitude) and the ring finger perceives *kapha (volume).*

Attributes of pulse	*Tridoṣika denominators*	*Appearance (classical simile)*
Rate Rhythm	*Vāta*	*Sarpagati* (crawling like a snake)
Amplitude	*Pitta*	*Maṇḍūkagati* (hopping like a frog)
Volume	*Kapha*	*Haṃsagati* (walking like swan)

It is possible to feel the three categories of attributes which can be palpated by only one finger or all the three together. But in the pulse examination, if a physician has to attain high proficiency, it is necessary that a separate finger is trained by him specifically to feel and perceive a particular attribute.

The Ayurvedic texts suggest that a physician should examine the pulse of the right hand of a male patient and the left hand of a female patient. This preference of right and left in relation to male and female patients respectively seems to be a mythological influence. However, many scholars believe that a woman is represented more truly (also in the biological sense) on her left. Sometimes it is considered in relation to the preponderance of the autonomic nervous system; for example, the parasympathetic system which is a left -sided phenomenon, is dominant in women.

A physician well trained in pulse examination has to determine the *vātika, paittika* and *kaphaja* characters or the three distinct clinical traits which may be predominant in some patients while in others, there may be a mixed picture. In respect of the latter, a physician has to judge carefully the relative preponderance of the three *doṣas.*

Characteristically a *vāta*-predominant pulse has a high rate, with or without accentuated rhythm, and a relatively low amplitude and volume. A *pitta*-predominant pulse is characterized by high amplitude, average rate and volume. The *kapha* predominant pulse, on the other hand, is recognised by high volume, low rate and average amplitude. Mixed types may present a mixed picture.

***Urine examination (mūtra parīkṣā)*:** The purpose of urine examination is to determine the *vāta, pitta,* and *kapha* manifestations by examining its volume, frequency, colour, consistency (pH and specific gravity as well as sediments), smell and taste (sweetened urine of a diabetic may attract ants). At present , besides these classical Ayurvedic approaches, the findings of modern urine analysis are also being given due Ayurvedic interpretation in terms of the disorders of *doṣa, duṣya,* and others.

The medieval Ayurvedic texts describe an interesting method of urine examination called *taila bindu parīkṣā,* wherein a patient's fresh morning urine is taken and sesame or mustard oil is dropped on the surface of the urine sample. The temperature, humidity and rate of air circulation as well as the intensity of light and force/height of oil drop etc., are

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controlled. The physician watches carefully the behaviour of the oil drop and its movement on the surface of urine—whether the drop dips in urine, is broken in to parts, remains as one *single* drop, moves in a particular direction slowly, fast, or very fast,—all of these undergo clinical interpretation, both biological and astrological. The behaviour of the oil drop on the urine surface depends on a number of physico-chemical properties of urine including surface tension which will have to be diligently considered.

Stool examination (mala parīkṣā): The examination of stool is carried out with a view to assessing what is called the *sāma-nirāma* state, the vitiation of *vāta, pitta,* and *kapha.* and related manifestations. Ordinarily, a physician examines with his eyes the volume, frequency, consistency, colour, smell of the stool etc., to give necessary interpretation to his findings in terms of the morbidity of *vāta, pitta, kapha, āma, agni* and *duṣyas.* A bulky foul smelling stool with unripe materials is suggestive of *kapha* and *āma* vitiation with lowered *agni.* A well formed ripe-looking stool with yellowish colour is usually *paittika* in nature and is *nirāma.* Small, frequent, and unformed dark stools may be considered to be *vātika.*

The Ayurvedic texts describe an interesting technique of stool examination for its *sāma/nirāma* state by what is known as *jala tāraṇa vidhi.* For this purpose, a physician takes a wide mouthed glass dish and fills it half with clean water. He puts a known amount of faecal matter (5-10g) over the surface of water. A stool which floats on the surface of the water is considered *nirāma,* and, if it sinks in the water, it is taken as *sāma mala.* The more *sāma* the stool is, the more quickly does it sink and disintegrate in the water. Although there can be a number of other factors which may influence this test, in the majority of cases it gives a dependable idea about the *āma* state.

As *āma nirāma* examination is of fundamental significance, it is worthwhile in this context to reassess the *āma* state through the following parameters : (i) profile of *āma* symptoms; (ii) *mala tāraṇa* test on stool for *sāma nirāma,* and (iii) measurement of the degree of antigencity of *āma* state by suitable immunological tests.

The Ayurvedic texts describe certain systemic signs and symptoms of the *āma* state, viz., slow digestion, heaviness in the body, lack of appetite, nausea, salivation, distaste, constipation, lethargy and the like. These symptoms may be appropriately graded to compare the *āma* state in a semi-quantitative manner to determine the degree of the symptoms of *āma.* The *āma* is a kind of auto-toxin and acts like a foreign substance or antigen in the body. The body in turn reacts to this antigenic material, immunologically releasing non-specific antibodies into the system. The titre of such antibodies may indirectly indicate the presence and severity of the antigenic state of *āma.*

Tongue (jihvā): Examination of the tongue reveals a variety of clinical information which helps in the *tridoṣika* diagnosis. The tongue also manifests the *āma* state of the body. A thick, soft, flabby and pale-coated tongue is indicative of *āma* and *kapha* disorder. A soft, sharp, red, and moist tongue is indicative of *pitta,* while a thin, dry, coarse, furred and pigmented tongue is suggestive of *vāta doṣa.* The tongue is considered as a mirror of the whole body particularly of the digestive system.

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***Speech and Voice (śabda)*:** The quality of voice or speech of a patient is readily altered in different states of diseases. *kapha, āma,* and *meda* disorders may make the voice heavy. *Pitta* may render the speech sharp and hot, while in the case of *vāta* disorder, the speech is thin, coarse, interrupted, or broken.

***Skin (sparśa)*:** The examination of the skin may reveal a wide range of its alterations caused by different kinds of morbidities. The pallor of the skin in anaemic patients, and yellowishness in cases of jaundice are classical examples. A soft, thick, whitish, smooth and moist skin is the feature of *kapha* while a wheatish, shining, moist, and soft but firm skin denotes *pitta* in contrast to *vāta* where the skin is ordinarily thin, mobile, dry, coarse, wrinkled, and pigmented.

***Eyes (dṛk)*:** Eyeballs are the real reflecting board of the entire body. According to modern Iridology, only the eyes, particularly the iris, is used for total diagnosis of health and disease. However, Ayurveda includes *dṛk parīkṣā* (examination of eyes) in a different perspective. Every clinician knows that the eyes are very readily altered in different clinical conditions. Anaemia and jaundice can be seen best in the eyes. A number of emotional states like anxiety, anger and depression are often visible in the eyes of a patient. From the *tridoṣika* point of view, big, whitish, clean, and slowly moving eyes are characteristic of *kapha*. Sharp, bright, moist, and pink colour of the eyes characterize *pitta,* while flickering, dry, dusky and pigmented eyes are suggestive of *vāta doṣa.*

***Face (ākṛti)*:** The face of a patient is considered as the most revealing part of his body, since both physical and mental disorders or distresses manifest themselves first on his face. Pallor, puffiness, sluggishness, anxiety and depression can be clearly read on his face. Though pain is felt by the brain, the shadow of pain is transparent on the face.

***Ṣaḍaṅga* and *srotasa parīkṣā*:** Each one of the major *srotasas* along with the related main organ is examined more or less in the same way as is done in modern medicine. However, in Ayurveda, the observations are viewed and codified in terms of the functions, disorders and manifestations of the *doṣas* and *duṣyas* in relation to the specific seat (*adhiṣṭhāna*) of pathology. The *ṣaḍaṅga* and *srotasa parīkṣā* are essentially designed for identifying the seat of the disease so that specific disease-oriented therapy can be lunched irrespective of *doṣa* and *duṣya*. Such specific treatment is prescribed only after gaining specific knowledge about the seat of the disease in accordance with the concept of *dravya prabhāva,* without which a physician can give only a *doṣa pratyanīka* treatment.

Labelling Diagnosis

After conducting a comprehensive total examination of a patient and his disease, the physician is expected to index all the clinical findings and to score them in terms of the relative disorders of the three *doṣas* and seven *duṣyas* (increased, decreased, vitiated or normal) as well as the seat of the main disorder. In addition, the physician may also try to label the diagnosis and relate it to a specific disease wherever possible. However,

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Caraka, the principal authority on Ayurveda, has emphasized that it is neither necessary nor always possible to give a name to every morbid condition. But it is indeed necessary to identify the nature of the disease in terms of its components, viz., the vitiating factors and the place of their origin, *doṣa, duṣyas* and *adhiṣṭhāna* or the seat of the disease, because a physician has to treat these components to dissolve the disease as it were. Prior to this, a physician labels the nature or the constitution of a patient, both his body and mind.

PRINCIPLES OF AYURVEDIC TREATMENT

In the light of the comprehensive character of Ayurveda, as delineated in the preceding pages, the treatment (*cikitsā*) is categorized into two broad divisions: (i) *naiṣṭhikī cikitsā;* and (ii) *laukikī cikitsā.* The *naiṣṭhikī cikitsā* is concerned with the care of an individual and his consciousness to prepare him for absolute freedom from the pain and misery of the world, leading to his liberation (*mokṣa).*Yoga and meditation are the main tools of this treatment which are considered as one that leads to liberation. This is the spiritual core of Ayurveda.

The *laukikī cikitsā* refers to the treatment of a disease or ailment afflicting an individual with its mental and physical dimensions. This is considered as the one leading to total health. As noted before, Ayurvedic classics describe three major streams of *laukikī cikitsā,* namely, (i) divine therapy; (ii) rational therapy, and (iii) psychotherapy. The first refers to the treatment of ailments due to a patient's events in his past life and it is concerned with the theory of *karma* or actions of past life in consonance with the concept of *punarjanma* or rebirth. It is believed that many diseases are caused in the present life of an individual owing to the actions of his past life carried over probably in terms of genetic codes. Such diseases can be treated only by appropriate and meritorious actions in his present life which may nullify the sinful actions of his previous life. This approach in therapy is called *daivavyapāśraya cikitsā.* Divine *karmas* like prayers, chanting *mantras,* oblations, *yajña,* wearing jewel stones, etc., are the usual methods of this type of treatment which is generally carried out by taking into consideration astrological factors. In present times, this aspect of treatment is practised more by astrologers than by Ayurvedists, although in ancient times it was an essential part of Ayurveda.

It is difficult to explain the *daiva vyapāśraya cikitsā* in terms of modern medical practice. It will have to be examined in relation to cosmology, astrology and genetics. In this approach the adopted curative measures may not only have some psychological effect, but may also have subtle influences on a patient's mind or consciousness as well as on the biosphere. There is a separate Ayurvedic concept relating to the psychological aspects, namely, the concept of *sattvāvajaya cikitsā* which is essentially psychotherapy, comprising psychodynamic methods to divert the psyche of an individual from unwholesome thoughts. For this purpose, a physician uses the technique of *āśvāsana* or assurance, replacement of emotions, and psychoshock procedures as and when needed. Thus divine therapy and psychotherapy are fundamentally different from each other.

Though, as mentioned earlier, Ayurveda lays greater emphasis on the promotion of health and prevention of diseases rather than on the treatment of diseases, it also

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provides an elaborate system of curative medicine with its own original approach. According to Ayurveda, a disease is essentially the result of morbid interaction of *doṣas* and *duṣyas* and *samprāpti*. Such a morbid process causes the body to be in a state of imbalance of *dhātus*. The object of Ayurvedic treatment is essentially to disengage the pathogenesis and to restore the balance of *doṣas* and *dhātus*. The first requirement for disengaging the *doṣa-duṣya* interaction is to eliminate the cause of the disease, (*nidāna parivarjana*), which is considered as the essential component of treatment.

The rational therapeutic approach (*yukti vyapāśraya cikitsā*) of Ayurveda is a planned treatment which is carried out in the matrix of the fundamental principles of Ayurveda, such as the theory of *pañcamahābhūtas, tridoṣa, triguṇa, rasa-guṇa-vīrya-vipāka,* etc. and the doctrine of *sāmānya* and *viśeṣa*. The Ayurvedic rational curative treatment is an integrated one with procedures of purification and palliation. Purification is done by *pañcakarma* therapy and related procedures, while palliation of *doṣas* is accomplished by the use of specific drugs, diets, exercise, etc.

According to Ayurveda, the human body comprises innumerable channels through which the biological and excretable materials flow. For the normal functioning of the body, it is essential that these channels, both gross and subtle, should remain intact and clean and not get blocked. If they get blocked due to the stagnation of *āma* and other *malas* or due to any other morbidity, they stagnate further the *doṣas* and *malas,* precipitating the *doṣa- duṣya summūrchanā* and *samprāpti* of a particular disease. Hence it is necessary that these channels are kept clean and competent. Ayurveda advocates a number of therapeutic procedures to clean the channels. These procedures are termed *samśodhana pañcakarma*—a set of five therapeutic procedures is described for purification. Thus *samśodhana* is the important component of all treatments in Ayurveda. As a matter of fact every patient needs one or the other form of *samśodhana* treatment before palliative measures (*samśamana*) in the form of a drug or diet are prescribed. The human body, which is biologically purified by *samśodhana,* is ready for spontaneous healing even without medication and, if any medication is given, it has a better chance of flow to the target site leading to better efficacy of the medicine with less side effects. Purification of the body is the essential part of Ayurvedic cure. Further, to disengage the *doṣa-duṣya* interaction, the cause of a disease has to be eliminated (*nidāna parivarjana*).

However, it may be mentioned that *samśodhana* is practised both externally (*Keralīya pañcakarma*) and internally (classical *pañcakarma*), both of them medicinally (by emesis, purgation, enema etc.) and non-medicinally (viz., by exposure to air and sun, fasting etc.). Palliative therapy is given to bring about therapeutic equilibrium of *doṣas* and *dhātus* by advising appropriate diet, drugs, exercise and lifestyle, leading to a bio-equilibrium called *prakṛti sthāpana,* or the restoration of normalcy.

According to Ayurveda, all physical objects including different articles of diet, drugs, parts and tissues of the body are essentially made of the five basic elements (*pañcamahābhūtas*) which also have five fundamental physical qualities characterizing earth, water, fire, air and *ākāśa*. A substance of similar property when added to similar ones, increases their character, and the reverse, decreases it. As mentioned before, this is called the theory of *sāmānya* and *viśeṣa* (homologous vs heterologous). This fundamental

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principle which is a law of nature, is utilized in Ayurveda for the selective use of products of nature, drugs, and diets for increasing or depleting the similar or dissimilar biological components of the interior milieu in the living body. If in a diseased state a particular category of materials in the body is decreased, a physician has to select similar or homologous drugs, diets and an overall lifestyle to restore the same. Similarly, if something is abnormally increased, it will have to be depleted by administering dissimilar or heterologous material.

It may be noted that all drugs and articles of diet are *pañcabhautika* in their constitution. Their quality and attributes vary due to the difference in the relative proportion in them of the *pañcamahābhūtas.* It is this variation that reflects itself in the *rasa* (taste) and *guṇa* (physical properties like hot, cold, etc). Thus by knowing the above properties one can estimate the *pañcabhautika* nature of a material and can utilize the same for therapeutic purposes for promoting or depleting a given component in the biological system following the principle of *sāmānya* and *viśeṣa.*

Thus Ayurveda uses a drug not as a chemotherapeutic agent to kill a virus or bacteria, but as a molecular nutrient to bring about homoeostasis in the system. An Ayurvedic drug is essentially not a pharmacological remedy like modern chemical drugs except some. In Ayurveda, the concept of a drug is nearer to that of the diet itself. The drug and diet both act on nutritional dynamics, the difference being only qualitative. However, this may be different in the case of drugs which have been described to act by their *prabhāva,* an activity which may refer to specific drug action that may resemble pharmacological activity of a drug. The diet and its regimen are given special importance in the *samśamana* aspect of Ayurvedic cure. Diet therapy is also used according to the doctrine of *sāmānya* and *viśeṣa* in relation to the nature of the five elements of the given diet and its taste and properties. The five elements being directly relevant to the three *doṣas, (vāta, pitta and kapha),* it is always easy to identify a diet for its homologous or heterologous role in curing a particular *doṣa.*

THE AYURVEDIC MATERIA MEDICA

Ayurveda does not consider a drug as the sole tool of cure as it advocates the use of several non-drug items in therapeutics. However, drugs and medicaments continue to be important considerations. Ayurvedic practitioners use a large number of herbs and other plant products singly or in combination. They also use several minerals and metals after sophisticated processing. It is beyond the scope of this chapter to describe all the Ayurvedic medicaments because, starting from the Ayurvedic classics to the medieval texts and the *Nighaṇṭus,* one may find thousands of plants and minerals recommended for therapeutic use. The following classification of herbal drugs advocated in relation to specific indications proposed in the *Caraka saṃhitā* (Su.4) will provide a glimpse of the drug science of Ayurveda.

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Classification of Drugs (plants)

1. *Jīvanīya* : promotes longevity and rejuvenation.
2. *Bḥmhaṇīya*: promotes nutrition and corpulency.
3. *Lekhanīya* : Promotes slimming and reduces weight.
4. *Bhedanīya:* disintegrators and eliminators of waste products.
5. *Sandhānīya:* promotes union and healing of broken parts.
6. *Dīpanīya:* Promotes appetite.
7. *Balya:* promotes body weight and strength
8. *Varṇya*: improves the complexion of the body
9. *Kaṇṭhya:* improves the voice and speech.
10. *Hṛdya:* improves cheerfulness and relish, also good for the heart.
11. *Tṛptighna:* promotes satiety.
12. *Arśoghna:* cures piles.
13. *Kuṣṭhaghna*: cures skin diseases.
14. *Kaṇḍūghna*: removes itching and pruritis.
15. *Kṛmighna*: anthelmintic.
16. *Viṣaghna*: antipoison/anti- allergic.
17. *Stanyajanana*: lactogenic.
18. *Stanya śodhana*: improves the quality of breast milk.
19. *Śukra janana:* promotes the production of sperm.
20. *Śukra śodhana*: purifies semen.
21. *Śnehopaga*: adjuncts the oleation effect.
22. *Svedopaga:* adjuncts the sweating effect.
23. *Vamanopaga*: adjuncts emesis.
24. *Virecanopaga*: adjuncts purgation.
25. *Āsthāpanopaga*: helps/adjuncts decoction enema.
26. *Ānuvāsanopaga*: helps/adjuncts oily enema therapy.
27. *Śirovirecanopaga*: adjuncts nasal insufflation therapy.
28. *Chardi nigraha:* anti-emetic.
29. *Tṛṣṇā nigrahaṇa*: anti-thirst.
30. *Hikkā-nigrahaṇa*: anti-hiccough.
31. *Purīṣa saṅgrahaṇīya*: antidiarrhoeal.
32. *Purīṣa virajanīya*: corrects the colour of stool.
33. *Mūtra saṅgrahaṇīya*: antidiuretic.
34. *Mūtra virajanīya*: corrects the colour of urine.
35. *Mūtra virecanīya:* diuretics
36. *Kāsa hara:* anti-tussive.
37. *Śvānsa hara*: anti-dyspnoea.
38. Śothahara: anti-oedema, anti-inflammatory.
39. *Jvarahara:* antipyretics.
40. *Śramahara*: anti-fatigue.
41. *Dāha praśamana*: has a cooling effect.
42. *Śīta praśamana*: has heating effect.

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43. *Udarda praśamana*: anti-urticarial.
44. *Angamarda praśamana*: anti bodyache; analgesic.
45. *Śūla praśama*: anticolic; antispasmodic.
46. *Śoṇita sthāpana*: haemostatic.
47. *Vedanā sthāpana*: analgesic.
48. *Sajñā sthāpana*: restores consciousness.
49. *Prajā sthāpana*: promotes fertility.
50. *Vayaḥ sthāpana*: sustains longevity i.e., anti-ageing.

The foregoing 50 therapeutic groups, each consisting of 10 drugs (total 500 plants) reveal the extent and systematic account of the classical use of medicinal plants in Ayurveda. Many of these are in popular use even today and quite a few of them have been recently evaluated for their indicated efficacy with positive results. The following is the list of selected plant drugs which are used today with promising results.

The names of plant drugs and their application

Area of Application	*Attributes*	*Name of Drugs*
Brain	Nootropic Psychotropic	Aśvagandha (*W. somnifera*) Brāhmi (*Bacopa monnieri*) Maṇḍūkaparṇii (*C. asiatica*) Śankhapuṣpi (*C. pluricaulis*) Jatāmānsi (*N. jatamansi*) Vacā (*A.calamus*)
Heart	Cardioprotectives Cardiotonics Hypolipidemics Antiplatelet	Arjuna (*Terminalia arjuna*) Guggulu (*C. mukul*) Puṣkaramūla (*S. lappa*) Vacā (*A calamus*) Rasona (*Allium sativum*)
Liver	Hepatoprotectives Choleretics	Kuṭaki (*P.Kurroa*) Kālamegha (*A. Panniculata*) Bhūmyāmalaki (*P. niruri*) Guḍūcī (*T. cardiofolia*)
Kidney	Nephroprotectives Diuretics Urinary Antiseptics	Punarnavā (*B. diffusa*) Punanavā (*B. diffusa*) Gokṣura (*T. terrestris*). Śilājatu (*Bitumen*)
Stomach and Duodenum	Mucoprotectives Antisecretory	Āmalakī (*E. officinalis*) Śatāvarī (*A.racemosus*) Madhuyaṣṭi (*G.glabra*)

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		Bhṛṅgarāja (*E.nigrum*)
		Citraka (*P.zeylanica*)
	Digestives	Ārdraka (*Z. officinalis*)
		Pippalī (*P.longum*)
		Mārīca (*P.nigrum*)
		Citraka (*P.zeylania*)
Intestines	Antidiarrhoeals	Kuṭaja (*H. antidysenterica*)
		Bilva (*E. marmelos*)
		Dāḍima (*P. granatum*)
		Ahiphena (*opium*)
	Anticonstipating	Triphalā
		Hārītakī (*T.belerica*)
		Senna (*Cassia angustifolia*)
		Trivṛt (*O.turpethum*)
		Eraṇḍa (*R. communis*)
		Yaṣṭimadhu (*G. glabra*)
		Jayapala (*M. pruriens*)
		Isopgola (*Plantago avaga*)
Reproductive	Aphrodisiac	Kapikacchu (*M.pruriens*)
		Aśvagandha (*W.Somnifera*)
		Śatāvarī (*A.racemosus*)
Others	Nervine	Balā (*Sida cardifolia*)
	Antiallergic	Haridrā (*Curcuma longa*)
		Śirīśa (*A. lebbeck*)
	Anti-aging	Āmalakī (*E. officinalis*)
	Anti arthritic	Bhallātaka (*S.anacardium*)
		Rasona (*A.sativum*)
		Kupilu (*S.nuxvomica*)
	Antistress	Aśvagandha (*W.somnifera*)
		Tulasi (*O. sanctum*)
	Anticancer	Bhallātaka (*S. anacardium*)
		Tulasi (*O.sanctum*)
		Arka (*C. procera*)
		Talisa (*A. webbiana*)
		Rohitaka (*T. undulata*)

Minerals and Metals

Ayurveda uses extensively minerals and ashed metals and organometallic compounds as medicine because contrary to herbal products, mineral and metal medicines are long-lasting and more efficacious. It is claimed that such preparations become therapeutically more effective and safe when they become old. The mineral products when processed with herbal Bhāvanā Dravyas, adopt their medicinal properties. These minerals are

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subjected to various systematic processes of *śodhana* or purification, *māraṇa* or oxidation etc. before their induction as medicine. The final products which are in the form of ashes or *bhasmas* and / or organometallic compounds, are claimed to be more effective than the herbal drugs and are prescribed in smaller doses.

The mineral materia medica of Ayurveda is classified into *rasa, mahārasa, uparasa, sādhāraṇa rasa, loha* or *dhātus* (metals) and *ratna gems* or precious stones. The term '*Rasa*' in this context is ordinarily reserved for Mercury thought it also covers any mineral or metal in the generic sense.

This is why the entire subject dealing with mineral materia medica is called *Rasaśāstra* and all the drugs of this category are called *rasauṣadhis*. However, *pārada* or mercury is the principal *Rasa*. The mineral materia medica of Ayurveda is classified below.

1. *Rasa*	1. *Pārada* (mercury).
2. *Mahārasa*	2. *Abhraka* (mica).
	3. *Vaikrānta* (turmaline)
	4. *Mākṣijka* (pyrites)
	5. *Vimala* (marcasite pyrite)
	6. *Śilājatu* (bitumen)
	7. *Tuttha* (copper sulphate)
	8. *Capala* (bismuth ore)
	9. *Kharpara* (calamite)
3.*Uparasa*	10. *Gandhaka* (sulphur)
	11. *Gairika* (haematite/red iron oxide)
	12. *Kāśīśa* (ferrous sulphate)
	13. *Sphaṭika* (alum)
	14. *Haritala* (orpiment)
	15. *Manaḥśilā* (arsenic disulphate)
	16. *Añjana* (collyrium)
	17. *Kankuṣṭha*
4. *Sādhāraṇa Rasa* :	18. *Kampillaka*
	19. *Samkhia* (Arsenic)
	20. *Navasaara* (Amm.Chloride)
	21. *Karpad*
	22. *Vahnijara*
	23. *Sindūra* (red oxide of lead)
	24. *Hiṅgula* (red sulphide of mercury
	25. *Mṛddāraśṛaṅga*
5. *Loha* (Metals)	
a.Siddha loha	26. *Svarṇa* (gold)
	27. *Rajata* (silver)
	28. *Lauha* (iron)
	29. *Tāmra* (copper)
b. *Pūti loha*	30. *Nāga* (lead)
	31. *Vaṅga* (tin)

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6. *Ratna* (Gems and precious stones)
   32. *Pittala* (brass)
   33. *Kāṃsya* (bronze)
   34. *Varta lauha*
   35. *Vaikrānta* (fluorspar)
   36. *Sūryakānta* (spunstone)
   37. *Hīraka* (diamond)
   38. *Candrakānta* (moonstone)
   39. *Muktā* (pearl)
   40. *Maṇi* (red gem)
   41. *Rājāvarta* (lapis lazuli)
   42. *Pukharāja* (topaz)
   43. *Pannā* (emerald)
   44. *Gomeda* (onyx)
   45. *Padmarāja* (ruby)
   46. *Pravāḷa* (coral)
   47. *Vaiḍurya* (cats-eye)
   48. *Nīlaṃ* (sapphire)

These minerals are used in medicine after their elaborate processing leading to suitable therapeutic formulations. They are used singly or in combination with several other metals and minerals as well as herbal and other biological products.

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CHAPTER 5

Surgery in Ancient India: Its Evolution and Progress

N.K. Pattanshetty

The World is very old and human beings are very young. Significant events in our personal lives are measured in years; our lifetimes in decades; our family genealogies in centuries; and all of recorded history is in millennia. But, we have been preceded by an awesome vista of time, extending to prodigious periods into the past, about which we know very little, because there are no written records and it is really difficult to grasp the immense intervals involved. [Carl Sagan][1].

INTRODUCTION

The history of disease–causing organisms is much older than that of mankind. Fossilized bacteria similar to those responsible for many infections that afflict man today have been found in geological formations that are 500 million years old. Examinations of the skeletons of dinosaurs and other great reptiles that roamed the earth millions of years ago show that these creatures suffered from fractures, bone tumours, arthritis, dental caries and other diseases that still constitute medical problems. Man has been subject to disease from the time of his and other hominid's first appearance on the stage of prehistory some four million years ago. The human body has been constantly exposed to assault and injury, to invasion by parasites, to extremes of heat and cold, and to infections. These diseases can be conveniently grouped as internal and external diseases. Early man regarded internal disease as being the result of a malevolent influence exercised by a supernatural being or by a human enemy. The situation with regard to injuries and external diseases is rather different. The first men became familiar with the sight of wounds and gradually developed some remedial measures to protect the wound by application of dressings by the leaf of a tree or a shrub. Thus during the prehistoric times, the art of dressing wounds long constituted the whole of medicine. The use of internal remedies and that of the knife or of cauterization came much later under the compelling influence of one or the other crisis.

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Indian surgery that forms one of the eight specialties of Ayurveda, was known as *Śalya-tantra* in ancient texts. Along with the other seven specialties of Ayurveda, *Śalyatantra* had reached the zenith of achievement, at an early stage of Indian history. Ayurveda is said to have its origin in the *Atharvaveda* (c. 1000 B.C.) though its principles, both scientific and philosophical could well have been derived from all the four Vedas. According to Indian mythology, Brahma is considered to be the creator of the universe and hence is believed to be the originator of Ayurveda.[2] Thus knowledge of surgery in India, must have been known many centuries before Christ. It was called *Śalya* (arrow) for the reason that the arrow of the enemy was regarded as the most common and dangerous of foreign objects causing wounds giving rise to pain and misery that required surgical treatment. Thus *śalyatantra* embraces all such sources of knowledge which aim at the removal of factors producing pain and misery to the body or mind.[2b] Even the removal of excessively vitiated morbid factors responsible for causing a disease, pain and misery, would come within the domain of *śalyatantra*.[3]

The earliest record of the treatment of wounds by herbs, is found in the Vedas. There is a mention in the Vedic literature about '*Aśvinau*' (the twin surgeons) who were capable of transplanting metallic femur, implanting different organs including the eye.[1] Management of *Garbhasaṅga* (obstructed labour), mūtra-saṅga (urinary obstruction), and the description of pathological organisms (*'Kṛmis'*), have been dealt with in the *Atharvaveda*. The use of drugs like *viṣānka,* and *lākṣa* has been advised to check bleeding; In the Rāmāyana; The story of Hanumān fetching *sanjīvinī* to treat and revive Lakṣhmana, who fell critically injured in a battle with Meghanād, son of Rāvana is well known. In the Mahābhāratā, Bhiṣma is said to have been attended by a band of army—surgeons when he was wounded during the war. It is said that even every soldier used to carry with him honey, ghee and bandages as first-aid materials. Thus we see that the art of treating wounds and surgical knowledge evolved and developed during the battles and catastrophes.

Literary sources of the Buddhist Period such as *Mahāvagga, Bhoja-Prabhandha, Nāvanītakaṃ,* allude to one Jīvaka who performed operations for *'antra samūrchana'* (intestinal obstruction), *kapālamocanī* (craniotomy) and even operations on the eyeball. Treatments of wounds and abscesses as well as various diseases by blood-letting were performed.[4,5] *Sauśruta-tantra* (400 B.C.) was probably the earliest record on surgical procedures authored by *Suśruta,* the son of Viśvāmitra and a leading disciple of Kāśīrāja Divodāsa Dhanvantari, a renowned surgeon.[6] It does not, however, mean that there was no practice of surgery before Suśruta's or Dhanvantari's period. Ever since the birth of humankind, trauma could have been the first ailment that man must have experienced and the treatment of its effect as a wound might have been thought of long before Suśruta. But until his time there was no systematic record of the treatment procedures. It is from this point of view that Suśruta is usually called *the Father of Indian Surgery*. He systematised the scattered knowledge of the various aspects of surgical techniques and also of allied subjects like obstetrics, gynaecology, paediatrics, geriatrics, and ophthalmology, including a description of anatomy, physiology and pharmacology, thus

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making his *tantra* one of the most comprehensive compendia of his times. Though this *tantra* is lost to posterity, its redacted version by *Nāgārjuna* (whom Acharya P.V. Sharma considers as of the 5th century A.D.) is now available by the name *Suśruta saṃhitā*.

Although all the eight branches of 'Human Life Science' have been detailed in the *Suśruta saṃhitā* the main calibre of the book lies in the description of surgical concepts and procedures. The entire compilation has been divided into six *sthānās* (volumes).

I. *Sūtra Sthāna*: deals with fundamental concepts of surgery and also includes knowledge about various herbs and drugs used as medicine;

II. Nidāna Sthāna: deals with the diagnostic aspects of different diseases —surgical and parasurgical;

III. Śarīra Sthāna: deals with the anatomical, physiological and also embryological aspects including obstetrics, pre- and post-natal care of the mother, and child care;

IV. Cikitsā Sthāna: deals with the treatment, both medical and surgical, including operative techniques, prognosis, and complications of various diseases amenable to surgery or para-surgery. It also provides an account of preventive medicine, the science of nutrition and geriatrics (*rasāyana*), reproduction and virility (vājīkaraṇa), therapeutics (pañcakarma i.e., five measures for cleaning the system from morbid factors to achieve homeostasis)

V. Kalpa Sthāna: deals with poisons.

VI. Uttara Sthāna (or *Tantra*): deals with the rest of the eight specialities of Ayurveda as follows:

Śālākya (Ophthalmology and Oto-rhino–laryngology);

Kaumārabhṛtya (Paediatrics, and Gynaecology);

Bhūtavidyā (Psychotherapy); and

Kāyacikitsā (Internal medicine, personal and social hygiene including dietetics).

This last section ends with a glossary (*Tantrayukti*) and discussion on *tridoṣās* which, according to Āyurveda, play an important role in pathogenesis. Some commentators are of the opinion that the *Uttara-Tantra* was added to *Suśruta saṃhitā*, subsequently by some unknown author/authors.

In any case, on going through the *Suśruta saṃhitā* available now in its redacted form, we can observe that every subject is classified and explained in a scientific manner, in the form of groups and sub-groups, divisions and sub-divisions. Such classifications were possible because of wide practical experience, close observation and logical interpretations. These have made Suśruta's work stand on a firm footing even today. As regards surgery, his observations and inferences are so thorough and complete that nothing else is known beyond them even after a lapse of 2000 years, since Suśruta practised surgery in ancient times.

During recent years, though technological knowledge has made advances, there are many areas where the basic approach of Suśruta in dealing with surgical problems, has more utility and practicability.

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FUNDAMENTAL CONCEPTS OF *ŚALYA TANTRA*

1. Vraṇa and Vraṇaśopha : *(wounds and inflammation)*

Vrana or wound is an entity of tissue destruction and discoloration following trauma, wherein permanent scar tissue is left behind on the body even on its healing.[7] A *vraṇa-śopha* or inflammation is an entity of tissue destruction following humoural derangements and, passing through the three distinctive stages, it becomes a *vraṇa*.[8] The former entity is an accidental injury and the latter is now understood as the outcome of the pathological sequence of inflammation which is a local reaction of living tissues to an irritant—physical, chemical or bacterial in nature—and which may lead to an ulcer, owing to cellular death of surface epithelium. Suśruta has classified this under six varieties: *chinna* (excised); *bhinna* (incised); *viddha* (punctured); *kṣata* (lacerated); *picchita* (crushed); and *ghṛṣṭa* (abrased).[9]

Any foreign body lodged in the tissues should be properly identified and at any cost, removed. In the absence of any radiological help during his time, Suśruta could diagnose the site, size and shape of a foreign body by physical examination only and deduce the correct measures for its removal.[10]

Thus, the subject of inflammation, ulcer and wound, their process of repair and management occupy relatively greater space in the *Suśruta saṃhitā*. Starting from the wound he has passed on through its various stages and included in its scope the management of an ulcer or wound both traumatic and contaminated. Describing the sixty types of management as given below, he has not lost sight of their cosmetic aspects. Many procedures for the removal of keloid, depigmentation, and even growth of hair are included.[11]

Sixty types of Management (Ṣaṣṭi upakrama)

1. *Apatarpaṇam* (restriction in diet)
2. *Ālepaḥ* (medicated plastering)
3. *Pariṣekah* (irrigation)
4. *Abhyaṅgaḥ* (anointing)
5. *Svedanam* (fomentation)
6. *Viṃlāpanaṃ* (resolution by massage)
7. *Upanāh* (poultice)
8. *Pācanaṃ* (suppuration)
9. *Rakta visrāvaṇaṃ* (blood-letting)
10. *Snehanaṃ* (use of oil; ghee)
11. *Vamanaṃ* (emesis)
12. *Virecanaṃ* (purgation)
13. *Chedanaṃ* (excision)
14. *Bhedanaṃ* (incision)
15. *Dāraṇaṃ* (bursting by local application)

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16. *Lekhanaṃ* (scraping)
17. *Eṣaṇaṃ* (probing)
18. *Āharaṇaṃ* (extraction)
19. *Vyadhanaṃ* (puncturing)
20. *Visrāvaṇaṃ* (drainage)
21. *Sīvanaṃ* (suturing)
22. *Sandhānaṃ* (alignment and union)
23. *Pīdanaṃ* (expressing)
24. *Śoṇitā sthāpanaṃ* (haemostasis)
25. *Nirvāpaṇaṃ* (application of anodynes)
26. *Utkārikā* (adsorbent poultices)
27. *Kaṣāya* (lotions)
28. *Varti* (wick)
29. *Kalka* (anointing)
30. *Sarpiḥi* (medicated ghee)
31. *Tailaṃ* (medicated oil)
32. *Rasakriyā* (medicated paste)
33. *Avacūrnaṃ* (dusting)
34. *Dhūpanaṃ* (fumigation)
35. *Utsādanaṃ* (stimulating granulation tissue)
36. *Avasādanaṃ* (anti-excessive growth of granulation tissue)
37. *Mṛdukarma* (softening)
38. *Dāruṇakarma* (hardening)
39. *Kṣārakarma* (cauterization by alkaline medicines)
40. *Agnikarma* (thermal cauterization)
41. *Kṛṣṇa Karma* (stimulating melanization)
42. *Pāṇḍukarma* (melanization)
43. *Pratisāraṇaṃ* (rubbing with powder)
44. *Roma sañjananam* (growing hair)
45. *Lomāpaharaṇaṃ* (epilation)
46. *Basti* (enemata)
47. *Uttarabasti* (urethral or vaginal douching)
48. *Bandhanaṃ* (bandaging)
49. *Patrādānaṃ* (padding)
50. *Krimighna* (antiseptic measures)
51. *Bṛhmaṇaṃ* (nutritional upkeeping)
52. *Viṣaghnaṃ* (detoxicating measures)
53. *Śiro-virecanaṃ* (decongestants for sinuses)
54. *Nasyaṃ* (nasal insufflation)
55. *Kavaladhāraṇaṃ* (gargling)
56. *Dhūmaṃ* (steam inhalation)
57. *Madhu sarpi* (use of honey and ghee)
58. *Yantraṃ* (use of splints, pulleys)

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59. *Āhāra* (diet)
60. *Rakṣāvidhāna* (environmental and psychic therapy)

In the *Suśruta saṃhitā*, the dressing of a wound has been described in detail. Bandages and their indications as well as the materials to be used for stitching a traumatic wound, have been well documented. The emphasis on protecting the wound from flies, contamination and maggot formation, is an ample proof of Suśruta's power of observation at such an early time, when the bacteriology as a science had not even been born, nor was the theory of asepsis and anti-sepsis, thought of anywhere in the world. He also advocated that the wound should be kept dry and clean for early healing.

2. *Dagdha—Vraṇās (burns and scalds)*[12]

These are tissue injuries due to heat or burns. Accidental burns are grouped into four categories depending upon the tissues burnt, which can be described according to the degree of signs and symptoms :

I *Pluṣṭa* (partial epidermal burn or First degree burn);
II *Durdagdha* (dermo-epidermal burn or second degree burn);
III *Samyagdagdha* (whole skin-thickness burn or third degree burn); and
IV *Ati-dagdha* (fatty and muscle layer burn or fourth, fifth and sixth degree burn)

It is recognized that a burn may be due to dry heat (*rūkṣa dagdha*), moist heat (*snigdha dagdha*—now known as a scald.) Suśruta had appropriately identified this difference, before starting treatment. Special kinds of *dagdhavraṇās* requiring specialized management were:[13]

(i) *Dhūmopahatadagdha* (asphyxiation by hot fumes);
(ii) *Uṣṇavātātapadagdha* (sun stroke);
(iii) *Śītavarṣāniladagdha* (frost-bite and chilblain);
(iv) *Atitejasā-dagdha* (burn by extremely hot objects); and
(v) *Indra vajrāgni—dagdha* (burn by lightning)

Thus Suśruta had observed that the damage of tissues produced by subnormal temperature as in frost-bite, and chilblain were identical in nature to those produced by the high temperature as far as the signs and symptoms in patients were concerned. By inhaling hot and pungent fumes, the patient develops dyspnoea and goes into shock as evident in asphyxiation by hot fumes.

3. *Śoṇitā sthāpanam (Haemostasis in bleeding wound)*[14]

The detailed procedures of controlling haemorrhage have been divided into four groups:

(i) *Sandhānaṃ* : (approximation of wound—margins in a gaping wound or use of styptic drugs in minor bleeding);

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(ii) *Skandanaṃ* : (use of coagulants)
(iii) *Pācanaṃ* (cauterization by using caustic drugs); and
(iv) *Dahanaṃ* (cauterization by use of hot objects)

Each one of the above measures is more potent than the previous one, and is indicated one after the other, to bring about haemostasis.

4. *Bhagna (fractures and dislocations)*

Before proceeding to discuss bone injuries, Suśruta necessarily had to describe the types of bones found in the body, to understand the effects of various injuries of these tissues. Each of the bones sustain trauma in different ways: the cartilages (*taruṇāsthi*) bend, the long bones (*nālakāsthi*) break, the flat bones (*kapālāsthi*) show multiple cracks, and the short and irregular bones (*rucakāsthi*) and also what is known as *valayāsthi* (vertebra) get fragmented.[15]

This fact helps us in diagnosing by inference a particular type of fracture at a particular site. Today we are able to examine an injured bone directly under radiological examination, but in the absence of this, Suśruta had evolved this useful and most logical method of determining the types of fractures, by inference.

Suśruta has classified the skeletal Injuries into two broad groups:[16] (i) Injuries of skeletal origin involving joints, i.e. dislocations, which he termed *sandhi—bhagna* or *sandhi muktaṃ*; and (ii) Skeletal injuries without any involvement of joints i.e. fractures which he termed *asthi bhagna* or *kānda bhagna*.

However, while describing the treatment of these injuries, Suśruta very clearly differentiates them as *sāvraṇa bhagna* (compound fracture) and *āvraṇa bhagna* (simple fracture).[17]

Suśruta has described separately the clinical features of skeletal injuries. The general features that suggest a dislocation are the inability to extend, flex, move sideways, or circumduct the limb accompanied by severe pain, and tenderness.[18]

The general clinical features of fractures are pain, marked swelling, tenderness, presence of crepitus, loss of function of the concerned part, and inability to find comfort in any position.[19]

Thus, what Suśruta suggested several centuries ago with meagre facilities of carrying out clinical investigations, is so perfect that there is hardly any room to permit any alteration at present. The following principles laid down by him are highlighted to indicate the height of development of Indian Surgery during that period.

1. The prognosis of a case of skeletal injury depends on several factors, namely, age of the patient, size of the injury, type of injury, the status of the bone and of the patient, and seasonal variations.[20]

2. Complications of skeletal injuries like malunion resulting from improper reduction or ineffective fixation, and suppuration, may occur locally. The systemic complications like fever, abdominal distension, cessation of excretions like urine and faeces, may occur in advanced cases.[21]

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3. Four principles of management of skeletal injuries recorded by Suśruta are:[22]

I. *Āñchanaṃ* (traction)
II. *Pīḍanaṃ* (manipulation by pressure)
III. *Sankṣepah* (reduction or apposition)
IV. *Bandhanaṃ* (immobilization)

These four principles are achieved in every type of fracture or dislocation by different methods.

By applying a suitable traction and by proper manipulation one can reduce the deformity of the fracture site to restore the normal anatomy. Similarly, proper and stable immobilization is an important step in successful management. Suśruta has used the barks of several trees to serve as splints. The important woods commonly chosen for this purpose are :

Madhūka (*Bassia latifolia*)—Indian Butter tree
Udumbara (*Ficus glomerata*)—Cluster Fig
Aśvattha (*Ficus religiosa*)—Sacred Fig
Plakṣa (*Ficus lacor*)
Vaṃśa (*Bambusa arundinacea*) Bamboo Sarja (*Valeria Indica*)
Vaṭa (*Ficus bengalensis*)—Banyan tree

Ensuring correct pressure in tying a splint has been emphasized. Suśruta has warned that a loose splintage will not be able to achieve the desired immobilization while, on the other hand, too tight a bandage might interfere with the vascular supply of the area resulting in oedema, pain and ultimately suppuration. Hence a proper bandaging is important.[23]

The use of a healthy limb as a splint to support an injured limb as in fractured metacarpal bone (*talabhagna*) is ingenious. Here, Suśruta advises joining the injured palm with the palm of the opposite side and tying them together.[24] Thus we see that the credit of devising such a ready and natural splintage goes to Suśruta. Similarly applying a prolonged traction in fractures of the femur by means of *kapāta-sayana* was Suśruta's invention.[25]

4. *Savraṇa Bhagna*; (management of compound fractures).

For the management of compound fractures, the wound has to be treated first before treating the fracture. The wound is dressed carefully with ghee and honey. This is to be followed by the treatment of fractures as mentioned before[26] earlier.

5. Rehabilitation.

The importance of physiotherapy in the case of a limb injury is rightly suggested. Suśruta advises lighter exercises to start with and they may be gradually increased. He devised lighter objects like a mud-ball followed by heavier substances made of rock salt and finally heavier ones made of stones to be held by the injured part.[27]

6. Criteria of ideal union.

According to Suśruta, the following findings should satisfy a surgeon before he declares that the injury has healed: absence of gap between broken fragments; absence of shortening; absence of deformity and return of painless and easy movement.[28]

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5. *Karṇa-nāsa-oṣṭha sandhānaṃ (Ear, nose, lip reconstructive surgery)*

Being a religious custom in ancient India to get the ear-lobes pierced during the sixth or seventh month of childhood, it was likely that surgeons might have come across a number of such cases in whom a torn ear-lobe needed repair as a part of cosmetic surgery. Also, as type of punishment the ear-lobes or nose used to be cut off in certain cases, the surgeons were called in for repair, remodel or restore the injured or cut ear-lobe or nose.

It is now an established fact that Indian plastic surgeons provided the basic ideas in the reconstruction of the injured nose, ear or lip. The contribution of Suśruta to Plastic Surgery can be called an outstanding one, because till the 19th century A. D. this branch of surgery had made little advance anywhere in Western countries.

Suśruta has described fifteen varieties of repairing torn or defective ear-lobes,[29] as follows under different circumstances:

(i) *Nemi-sandhānāka*—(when both flaps are equal in size, thick and wide)
(ii) *Utpalabhedyaka*—(when flaps are equal, round and elongated)
(iii) *Valluraka*—(when flaps are equal, round and short)
(iv) *Āsaṅgima*—(when inner flap is longer)
(v) *Gaṇḍakarṇa*—(when outer flap is longer)
(vi) *Āhārya*—(when both flaps are absent)
(vii) *Nirvedhima*—(when flaps are absent, but have tiny base)
(viii) *Vyāyojima*—(when flaps are irregular or uneven)
(ix) *Kapātasandhika*—(uneven flaps, with small outer flap)
(x) *Ardhakapāta sandhika*—(outer flap is long with small inner flap)
(xi) *Saṅkṣipta*—(when auricle is shrivelled and destroyed)
(xii) Hīnakarṇa—(where there is no support or it is devoid of muscles)
(xiii) *Vallīkarṇa*—(irregular lobe, thick and small)
(xiv) *Yaṣṭikarṇa* (small lobule and shrivelled)
(xv) *Kākauṣṭaka* (when the lobule is devoid of muscle and is tiny)

The description of Suśruta about the principles of Rhinoplasty *(Nāsā-sandhānaṃ)* is exactly what present day plastic surgeons name as **pedicle grafting**. A patch of living flesh including the skin, subcutaneous tissue along with the circulatory attachment is raised from the adjacent portion of the body and transferred to the scarified portion of the nose. This attachment must be maintained until a new circulation has developed from the nose—the recipient site. Care should be taken to insert two pipes into the nostrils to facilitate breathing.[30]

A similar operation, *oṣṭha sandhānam* (labioplasty) for severed lips has been described by Suśruta with a difference that no pipe is required here.[31]

Thus Suśruta can be called the originator of plastic surgery. The cosmetic part of plastic surgery is also given its due consideration viz. measures to elevate the depressed scar tissue, similarly to depress the raised sear tissue, restoration of the normal colour of the skin, hair etc. have been dealt with in detail and these can be collectively termed *Vaikṛtā-paha cikitsā*.[32]

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6. *Para-Surgery (anuśastra karma)*

Except for a few varieties of *bhagandara* (fistula-in ano) and arśus (haemorrhoids), where surgery was indicated, a majority of these ano-rectal conditions were subjected to para-surgery with success by our ancient surgeons.

In para-surgery as a specialty, Suśruta has advocated the use of *kṣāra* (medicinal caustics) and *agni* (thermo cauterization). In modern surgery there is no cure for these conditions. The treatment offered now by surgical intervention (fistulectomy) or (haemorrhoidectomy) have a 50 per cent chance of recurrence in the best possible hands. In properly selected cases, applying Suśruta's *kṣhāra-sūtra technique* revived and standardized by the late Dr. P. J. Desha-pande, Dr Pathak and other staff of the Post-graduate Department of Śalya-Śālakya at Banaras Hindu University, 97 per cent cure rate has been reported in curing fistula-in-ano.

The *Suśruta saṃhitā* deals with the subject of *ksāra* in an independent chapter (Sutra 11), wherein the types of kṣāras, their preparation, properties and usage have been described in detail. Among the various diseases, Suśruta specially advocated the use of ksāra in the management of *nāḍīvraṇa* (sinuses), *bhagandara* (fistula-in-ano) and even in *arbudās* (tumours), probably owing to the incidence of non-recurrence after its use, and also due to the fact that surgery in these conditions would invariably lead to various complications. A number of herbs (see below) with medicinal properties have been identified for preparing the *ksārās* which are basically alkaline, obtained from plant sources.

These are as follows:[33]

Kuṭaja : (Holarrhena anti-dysenterica)
Palāśa : (Butea frondosa)
Aśhvakarṇa : (Śāla) : (Shorea robusta)
Paribhadraka (Nimba). : (Melia azadirachta)
Bibhītaka : (Terminalia belerica)
Āragvadha : (Cassia fistula)
Tilvaka (Lodhra) : (Symplicos racemosa)
Arka : (Calotropis gigantea)
Snuhi : (Euphorbia nerifolia)
Apāmārga : (Achyranthes aspera)
Pāṭalā : (Sterospermum suaveolens)
Karañja : (Pongemia glabra)
Vṛṣa (Vāsā) : (Adhatoda vasica)
Kadalī : (Musa sapientum)
Chitraka : (Plumbago zeylanica)
Puṭī-Karanja : (Caesalpinia bonducella)
Ashvamāraka : Karavira : (Nerium odorum)
Saptaparṇa : (Alstonia scholaris)
Agnimantha : Clerodendron phlomidis)
Guñjā : (Abrus precatorius)
Kośātaki: (Luffa amara)

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Apart from the above–mentioned diseases, *kṣārakarma* is indicated in the following chronic ailments also : Chronic non-healing ulcers (*duṣṭa vraṇa*), intractable skin ailments (*kuṣṭa*), psoriasis (*kitibha*), ring-worm (*dadru*), leucoderma (*kilāsa*); warts (*charmakīla*); moles (*tilakālaka, nyacha, vyanga, maṣaka*); diseases of the mouth like ranula (*upajivhā, adhijihvā*) gum disorders, dental diseases and throat ailments.[34]

Agni Karma (thermo-therapy or thermal cauterization), another speciality of para-surgery, though indicated in different ailments by preceptors like Punarvasu and Agniveśa, its proper documentation with all the details appeared only in *Sauśruta Tantra* for the first time, and the same is described in *Suśruta saṃhitā* which advocates its use in diseases not amenable to medicinal, surgical or other para–surgical treatments.[35]

It is indicated in the case of the following conditions.[36]

śiroroga (*kaphaja* and *krimija* varieties)

Adhimantha (*kaphaja* variety of eye disease, glaucoma)

Pakṣmakopa (trichiasis)

Duṣṭa vraṇa (non-healing indolent ulcer)

Granthi (cyst) arbuda (tumours)

Arśus (haemorrhoids and polyps); *bhagandara* (fistula in ano)

Apacī (lympho glandular swellings which are long standing)

Ślīpada (elephantiasis)

Charmakīla (warts)

Tilakālaka (moles)

Antravṛuddhi (hernia)

Sandhiroga (joint diseases)

Sirāchedana (vascular injuries)

Nāḍīvraṇa (sinuses)

Śoṇita-ati pravṛutti (excessive haemorrhage—localized)

For conducting therapeutic cauterisation Suśruta has advised the use of the following materials depending upon the pathological site of the diseases:[37]

The dried fruit of pippalī (*Piper longum*)

Ajā śakṛd (dried faecal matter of goat)

Godanta (cow's teeth)

Śara (arrow head)

Śalākā (metalic rod)

Jambavauṣṭa (a special instrument designed for *agni karma*)

Itaralauha (gold and other metals)

Kṣoudra (honey)

Guḍa (jaggery)

Snehā (oils and fats)

and others : *Sarjarasa* (exudate of a tree, *Valeria indica*)

Madhūchhiṣṭa (bees wax)

Further,Vāgbhaṭa in Aṣṭāṅga hṛidaya (*Sūtra sthāna*; 30th chapter) advised the use of *sūrykānta* (Sun-stone) as one of the materials for cauterization.

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7. *Rakta Visrāvaṇam or Rakta-Mokṣaṇam (Blood-letting)*

Like the other contemporary physicians, Suśruta has also given due importance to the humour, *rakta dhātu* which when vitiated by the doṣās, (endogenous vitiators) give rise to a number of diseases which can be grouped as *śoṇitajanya roga*. Being a surgeon Suśruta identified a number of surgical measures along with other medical measures for their cure. He seems to have been of the opinion that a properly followed method of blood-letting, would prevent the onset of the following diseases:[38] *tvakdoṣās* (skin diseases); *granthi—śirāja* (aneurysms and varicosity); *śhopha* (swelling) and *śoṇitaja vyādhi*. Among these, the last group includes the diseases such as *rakta gulma* (certain intra abdominal swellings); *vidradhi* (abscesses); *arbuda* (tumour); *viṣrpa* (erysipelas); *stana roga* (breast diseases), *viṣa-juṣṭa śoṇita* (septicaemia), which deserve special mention, where the vitiation of *rakta* predominantly occurs in the pathogenesis, necessitating it's letting out.

Further, Suśruta advocates five different methods to let out the vitiated blood:[39]

(i) *Sirāvyadha* (vene puncture or vene section by certain types of surgical instruments);
(ii) *Viṣāṇa* (by applying horn);
(iii) *Tumbi*, Alābu (application of bitter gourd);
(iv) *Jalaukā* (by the application of leeches of the Hirudoid medicinalis group); and
(v) *Pada* or *pracchāna* (incising by a surgical instrument)

Of the above measures, *sirāvyadha* is the most potent one, followed by the other four, in descending order. For *śirāvyadha* and *Pracchāna karma*, a sharp surgical instrument is required, whereas the other three measures (which are non-surgical or para-surgical) require the use of either horn, *tumbi* [bitter gourd] or leeches. In this context, Ḍalhaṇa, the authoritative commentator of *Suśruta saṃhitā* opines that the use of sṛṅga or alābu are delicate measures; hence they can be reserved for children, old, persons, women, and for those of delicate constitution. Similarly the use of leeches being the most delicate method, can be resorted to in cases that are most delicate in their constitution. *Pracchāna* and *Śirāvyadha* should be reserved for persons who are not so delicate, but are strong. Further, depending upon the site of the dosic involvement, for the most superficial site *pracchāna karma* is preferred, followed by treatment using leeches, bitter gourd, and horn vene-section or vene-puncture, depending upon the depth of the tissue involved in that order.

(i) ***Venesection:*** Since many surgical diseases are prone to the vitiation of blood, Suśruta considers blood-letting by venesection (or vene-puncture) as half treatment (*cikitsārdha*). Sometimes, in many of the surgical diseases which are not amenable to conservative lines of treatment like oleation, sudation, etc. if subjected to proper vene section the patient may find quick relief from symptoms.[40]

It should be said to the credit of Suśruta that he has given extensive details of the indications and the respective sites of venesection as described in the *Suśruta saṃhitā* in

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terms of *añgula* (one *augula* =10 mm.approx.) and the same is to be followed after taking precautions to avoid injury to the vital points (*marma-sthānaṃ*).[41]

In this context Suśruta has not lost sight of the likely complications that may be encountered by a surgeon and has advised him to take proper precautions against them.

(ii) *Blood- letting by Śṛṅga Yantra (i.e. Viṣāṇa)*: This instrument, designed in a tubular shape like a cow's horn, was used for letting out the blood, vitiated by *vāta*. Initially, the site on which this instrument is used is subjected to *pracchāna-karma* i.e. making a number of linear incisions. Then, one end of this instrument is applied over the bleeding point and from the other end, the blood is sucked-out through a thin cloth, tied over it. The present day suction tubes are the modified versions of *srunga yantra* as far as their functions are concerned.

(iii) *Blood-letting by Alābu Yantra (Tumbi).* This is in the form of bitter gourd from which the pith has been removed and made hollow or cup-shaped. This appliance was used by ancient Indian physicians and surgeons alike at the time of letting out the *kapha duṣṭa rakta* or blood vitiated by *kapha*. Suśruta advises the use of a piece of ignited cotton inside the gourd before its application over the site, so that a sort of vacuum is created, thereby facilitating the blood-letting.

(iv) *Blood-letting by means of leeches (Jalauka)*: This is another para-surgical practice for letting out the *pitta* vitiated blood advocated by physicians and surgeons as well, wherein living leeches, which were non-poisonous in nature, were used. The *Suśruta saṃhitā* deals with this topic in greater detail regarding the identification of the non-poisonous varieties of leeches and indications for their use in various disorders. Even the pre- and post-operative procedures have been described. Vāgbhaṭa later elaborated this particular treatment. Non-poisonous varieties of leeches identified by Suśruta were *kapila, piṅgala, śankumukhi, mūṣikā mukhī, puṇḍarīka mukhī* and *sāvarikā*.[45]

Suśruta indicates their use in the case of inflammatory swellings, which are hard, wide based, uneven and toxic in nature.[46] Vāgbhaṭa elaborated their use in *gulma* (non-inflammatory intra-abdominal swellings); *kuṣṭa* (skin disorders) *vāta-rakta* (gout); *galamaya* (neck swellings); *netra-ruk* (eye diseases) and *visarpa* (erysipelas).[47]

This type of para-surgery is useful for persons who are most delicate in their constitution eg. children, and women, and for those who are fearful by nature.[48]

(v) *Blood-letting by sharp knife superficially (Pracchāna* or *pada)*: A sharp surgical instrument like *kuśa patra* (bistoury), *atimukha* (lancet), *śarārimukha* (pair of drainage scissors), *antarmukha* (abscess knife, curved and folding type of bistoury), were in use for blood letting. In the *pracchannakarma* longitudinal finer incisions in superficial tissue were made side by side, without injuring the important deeper tissues.[49] Suśruta indicates its use in inflammatory swellings, which are toxic in nature.[50]

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8. *Śastra-yantra-sangrahaṇaṃ (Surgical armamentarium)*

A surgeon's fight against diseases may not be a thorough one, unless he/she is well-versed in the knowledge of accessories and their proper handling. These are: (i) Instruments; (ii) medicaments; and (iii) bandages. The evaluation of the knowledge of these accessories for a good surgeon is indeed essential and Suśruta's contribution in this direction is noteworthy.

Instruments

The status of surgery in any part of our globe at a particular time, could be judged by the quality and choice of instruments available or described at that time.

In *Sauśruta Tantra* the description of surgical instruments had received a thorough attention. Besides a systematic classification of instruments into 20 types of *Śāstras* (sharp instruments), and 101 types of *yantras* (blunt instruments), the methodology of naming them after birds and animals, their size, shape and indications in different surgical procedures, their maintenance as well as sterilization—all these were the original, recorded contributions of Suśruta to the art of surgery over 2000 years ago. This is evident from the available reference from *Suśruta saṃhitā*.[51]

According to Suśruta, the hand of a surgeon including the fingers should be considered as the most important because functions attributed to all the instruments depend upon the expertise of the surgeon's hand.[52]

The surgical instruments, both sharp and blunt, should be of good quality i.e. they should be convenient to handle, made of superior metal; they should be sharp or blunt as the case may be and appropriately designed for the purpose of their use.[53]

Different types of tempering (*pāyanā*) of the instruments used for different purposes, their sharpening measures (*dhāra saṃsthāpanaṃ*) in the case of sharp instruments and related aspects have been described by Suśruta. To test their quality of sharpness or otherwise, he designed a process of cutting across a hair (*romachedanam*) and, if the instrument cut the hair, it would denote that the instrument is sufficiently sharp.[54]

(a) Sharp instruments for excision (chedanaṃ): To cut out a part of the body or tissue, the following sharp instruments were designed:[55]

Maṇḍalāgra (circular knife)
Karapatra (bone-saw)
Vṛuddhipatra (scalpel, dissecting knife, bistoury)
Nakha śastra (nail parer)
Mudrikā śastra (finger knife)
Utpala patra (lancet, phlebotome)
Ardhadhārā (single-edged or half-edged knife)

To the above list, Vāgbhaṭa, added *sarpāsya* for excision of a nasal polyp. He also used a type of *kartarī* (pair of scissors), for excision.

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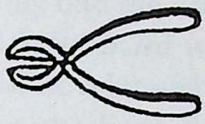
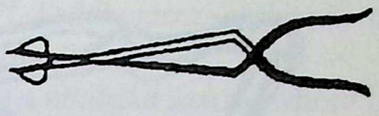
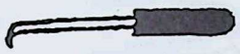
ŚASTRAS

Āṭimukha śastra





Antarmukha Kartārikā



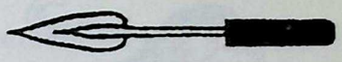
Maṇḍalāgra śastra

Karapatra śastra

Dantaśaṅkhu śastra

Kuṭhārikā śastra

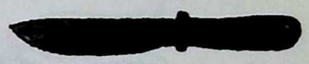
Nakha śastra



Vetasapatra śastra

Eṣanī śastra

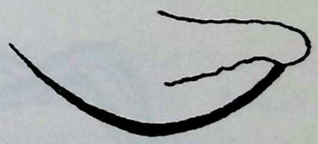
Vrīhimukha śastra



Ardhadhāra śastra

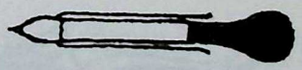
Bādiśa śastra

Ārā śastra

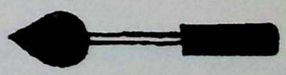


Sūcī śastra

Utpalapatra śastra



Trikūrcaka śastra



Śarārimukha śastra

Some of the Śastras (Sharp Instruments) and Yantras (Blunt Instruments and Accessories) as Described in the *Suśruta Saṃhitā* and by its commentators (Diagrams)

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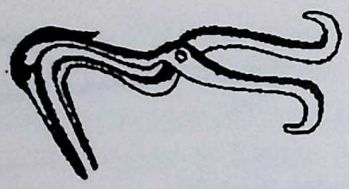
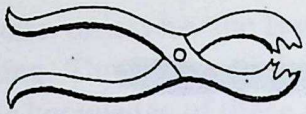
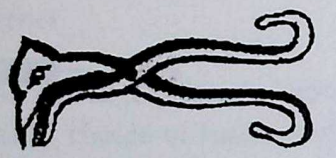
YANTRAS



Kaṅkamukha Svastika, or Heron forceps

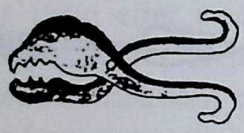


Siṃhamukha Svastika, or Lion forceps

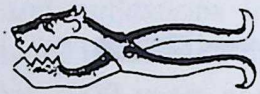


Cāsamukha Svastika, or Blu-Jay forceps

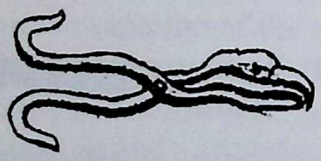
Tarakṣumukha Svastika



Vyāghramukha Svastika

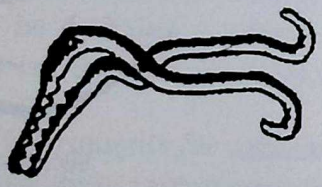


Vṛkamukha Svastika

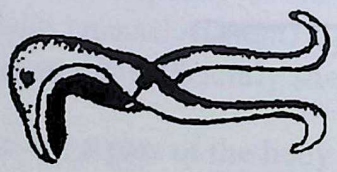


Śaśaghātīmukha Svastika, or Hawk forceps

Basti yantra



Makaramukha Svastika, or Crocodile forceps



Kākamuktha Svastika, or Crow forceps

Śṛgālamukha Svastika, or Jackal forceps

(Source: *The Surgical Instruments of the Hindus* by G.N. Mukhopadhyaya)

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(b) Sharp instruments for incision (bhedanaṃ) : To cut deeper into the tissues, the following sharp instruments were designed which could also be used to cut at the dermal level apart from their use for cutting into the deeper tissues.[56] *Vṛddhipatra, nakha śastra, mudrikā sastra, utpala patra* and *ardhadhārā* were all used for incision.

The knife used now for Mitral valvulotomy operations is a *mudrikā śastra*, where the index finger of a surgeon guides the knife devised on a ring worn on the finger to minimize the tissue damage at the time of operation.

***(c) Sharp instruments for scraping, scarification* or *curetting (lekhanaṃ)*:** To make clean, smooth or for levelling the tissue, *mandālāgra and karapatra* were designed for the purpose of scraping or curetting.[57]

***(d) Sharp instruments for puncturing or tapping (vyadhanaṃ; dāraṇam)*:** The instruments that were long and pointed and could pierce into the tissue, were designed for puncturing the veins, abscesses, or collections of accumulated fluid.[58]

These were:—*Kuṭhārikā* (axe-shaped knife; chisel); *Vṛīhīmukha* (trocar); *Ārā* (awl); *Vetasapatra* (scalpel); and *Sūcī* (needle).

To the above list can be added a special puncturing instrument for use in cataract, known as *liṅganāśa vyadhani Śalākā Śastra* (cataract needle); and *karṇavyadhana śāstra*(needle for piercing the ear-lobe).[59]

***(e) Sharp instruments for probing (eṣaṇaṃ)*:** For probing the sinuses (*nādivrana*) and non-healing ulcers having a foreign body inside, Suśruta designed three types of cutting probes with sharp margins known as *eṣaṇī śastra*.[60]

***(f) Sharp instruments for extraction (āharaṇaṃ)*:** Different types of sharp hooks resembling fish-hook for the extraction of a foreign body, dead foetus from uterus or a scybalum from the anus, were designed. Similarly a tooth scaler (*danta-śaṅku*) with a curved end was used for the extraction of a tooth.[61]

***(g) Sharp instruments for the drainage of fluid or vitiated blood (visrāvaṇaṃ)*:** Suśruta advised the use of *kuśapatra* (knife, straight bistoury);[62] *atimukha* (lancet); *sararimukha* (pair of drainage scissors); *antarmukha* (curved bistuory); trikūrchaka (a tiny instrument having three sharp bristles); and *sūcī* (needles).

To the above list, Vāgbhaṭa's *kurcha, khaja* and *kartarī* can be added for the purpose of draining out fluid.

(h) Sharp instruments for suturing (sīvanaṃ) : Suśruta designed different types of needles for suturing superficial or deeper tissues. Such needles were either round-bodied or triangular, curved or straight.[63] Further, Vāgbhaṭa described a needle with a hidden-eye for processing the thread known as *gūḍha pāśaṃ*.[64]

Suśruta has also given details of how to hold the sharp instruments during surgery, and Vāgbhaṭa has followed him. They have stated as follows: a surgeon should hold them appropriately to achieve the purpose for which they are indicated. For example, a scalpel

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and the like should be held at the junction of its handle and blade while performing the incision. If the same instrument is required to be used for scraping, the surgeon's hand should be held in a slightly raised position and at an angle; if the instrument is used for draining pus or fluid, it is held between the handle and the blade. The trocar should be held in such a way that its handle should be under cover of the palm with the thumb and index finger holding the instrument. The *ārā* (awl), *karapatra* (the bone-saw) as well as *eṣaṇi* (the sharp probe) should be held at their base.

Anu Sastras[66]

These were the substitutes for sharp instruments. In the absence of sharp instruments and for use in the case of small children and persons who were frightened of instruments, Suśruta advocated the use of certain substitutes, which were classified as *anuśastra*. They were bamboo-bark; rock-crystal, glass, leaves of *pāsāṇa-bheda* (*Saxifraga ligulasa*), gojivhā (*Onosma bracteatum*), night jasmine as well as that of the teak-wood, thorn from the caper plant (*karīra*), leeches, caustics, alkalis, cauteries, nails, tuft of hair, and the finger proper.

Blunt instruments, Appliances, Accessories

Suśruta defined *yantra* (Blunt instrument) as the material which could facilitate surgery or to control the disease during surgical operations, or by which a foreign body could be extracted easily out of a patient. Though such instruments are stated to be 101 in number, they were in fact innumerable depending upon a surgeon's wisdom. They could be grouped under the following headings on the basis of their shape, function and characters.[67]

***(i) Svastika*[68] *(cruciform instruments)*:** which should have a fulcrum at the centre and around which its cross-action blades act to achieve the function of extraction of a foreign body from the superficial or deeper tissues especially from bone. Suśruta had named them after animals or birds. The bone forceps, dental forceps, Ferguson's lion jaw forceps, dental hawk-bill forceps used in the modern surgical armamentarium can be grouped under this category. The artery forceps now designed to catch the bleeding vessels and the needle-holder used now for holding the suturing needle are examples of the *Svastika Yantra*.

***(ii) Sandaṃśa*[69] *(gripping Instruments; pincers)*:** Suśruta has described two types of such instruments—one with a handle and another without any handle. They were used for extracting a foreign body from the soft tissues. Vāgbhaṭa added some more *sandaṃśa yantra* to the above list[70] as follows : *Upapakṣaṃa-haraṇa sandamśa* (ciliary forceps); *Muchundi sandaṃśa* (forceps with teeth); *Sanibandhana sandaṃśa* (forceps with a catch); and *Nir-nibandhana sandaṃśa* (forceps without a catch).

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The dissecting forceps with or without teeth used now in modern surgery, belongs to this category of instruments.

***(iii) Tāla*[71] *(scoops; disc-shaped instruments)*:** For removing the foreign bodies from ear and nose, such scoops were used.

4. *Nāḍi* (Tubular instruments):[72] These were hollow inside and of different types, used for different purposes. Some of them were in use for the extraction of a foreign body; some were meant for diagnostic purposes (*rogadarśana*); some were for suction; and others were for facilitating the operation. A large number of tubular instruments have been described by Suśruta and Vāgbhaṭa.[73] Male and female catheters used nowadays for the evacuation of the urinary bladder, belong to the category of *nāḍi yantra*. Thus the credit of initiating such techniques for diagnosing a lesion, using tubular instruments goes to *Suśruta*, which ultimately led to the development of a wide range of endoscopes used today.

(v) Śalākā*[74] *(rod-shaped instruments) : These were used for different purposes and they differed in their size and shapes; but a common feature was that they were not hollow inside, nor sharp. Suśruta has given an account of eleven types of rod-shaped instruments and Vāgbhaṭa added four more.

Upa-yantra

(Other accessory instruments or *anu yantra*): Such instruments that could not be categorized in any of the aforesaid groups were classified separately as *Upa yantrās*: they are: *Rajju* or *sūtra* (thread); *veṇika* (twine); *Paṭṭa* (Bandages); *Carma* (hide); *antarvalkala* (barks); *latā* (creeper); *vastra*(cloth); *asthilāṣhma* (round pebble); *mudgara* (hammer); *pāṇitala* (palm); *pādatala* (foot); *aṅgulī* (finger); *jihvā* (tongue); *danta* (tooth); *nakha* (nail); *mukha* (mouth); *aśvakaṭaka* (rein); *śākhā* (branch of a tree); *ṣṭīvanaṃ* (act of spitting); *pravāhanam* (act of excreting flatus, faeces, foetus, urine); *harṣa* (imparting pleasure); *ayaskānta* (magnet) *kṣāra* (medicinal caustics like alkalis), *agni* (fire or cauteries); *bheṣhaja* (medicaments).

Vāgbhaṭa has added a few more accessories to the list.[77]

Medicaments (bheṣaja)

Suśruta had a wide range of choice of various medicinal preparations for external applications as well as for internal usage. For external application medicated pastes, paints, plasters or pigments—all collectively termed as *ālepa* which were mostly indicated in all the stages of inflammation. To bring about antiseptic, astringent, analgesic or caustic actions, in the course of the healing process.[78]

In the pre-operative procedures much importance was given to the preparation of a patient for surgery, by resorting to specialized therapeutic measures known as

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Pañcakarma. Here, the cleansing of various bodily systems of morbid factors was made possible by specific medicaments which could mitigate the vitiated *doṣas* and thereby bring about an uneventful recovery in the patient. Similarly, in the post-operative procedures several medicaments that could improve the strength and vitality of a patient were appropriately advocated by Suśruta.[79]

In the *Suśruta saṃhitā*, apart from the medicaments for external use noted above, the knowledge regarding various herbs and drugs including animal products used as medicines and foods has been presented in the 38th, 39th, and 42nd to 46th chapters of *Sūtra -sthāna*, medicaments useful for the treatment of various surgical diseases including preventive medicine, nutrition, along with geriatrics and sexual therapeutics have been dealt with in the *Cikitsāsthāna*. Antidotes of poisons and the management of the patient in *kalpasthāna*; and the medicaments pertaining to the remaining specialities of Ayurveda—all these are dealt with in Uttara-Tantra. Obstetrics and neo-natology including embryology and anatomy are dealt with in *Śarīra-sthāna*.

Bandages (bandha)

Though bandaging is an art and an accessory aid, it is vital for a surgeon for achieving the desired results. Suśruta has described fourteen types of bandages covering their indications on all parts of the body.[80] His words and approach are illuminating so far as bandaging of the wounds is concerned. Vāgbhaṭa added one more type of bandage to the list called *utsaṅgī bandha* (arm-sling bandage).[81]

Suśruta's descriptions about the indications and contra-indications for bandaging, frequency of changing the bandage with respect to the type of lesion, seasonal variations, age of the patient etc. are exemplary.[82] He advised the use of flax or jute and cotton.

Flannel or wool (*avika*), cloth (*dukūla*), silk (*kouśeya*); tussore silk (*patrorṇa*), Chinese cloth (*Chīna patta*), leather (*carma*), bark of trees, bamboo; gourd from which pith has been removed, metal, etc, were used for bringing about correct bandaging. He advised the use of leather for a 'T' shaped bandage or sling (*gophaṇā*). Tree-barks, bamboo, and metals were used as splints (*kuśa*).[83] To suit different locations of the body, various types of bandages were advised with certain modifications like they could be tied loose, tight or otherwise keeping in view the type of wound and the season during which the bandaging was to be done.[84]

The types of bandages and their locations are as follows:[85]

1. *Kośa* (sheath bandage): for fingers or toes.
2. *Dāma* (quadruped arm-sling): Painful arm and hip.
3. *Svastika* (cross or spica): shoulders and other joints.
4. *Anuveḷlita* (spiral): limbs of uniform girth.
5. *Pratoli* or *Muttoli:* penile; cervical.
6. *Maṇḍala* (circular): over the chest.
7. *Sthagikā* (stump): fingers, toes, scrotum.
8. *Yamaka* (twin bandages: two wounds situated adjacent to each other.

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9. *Khaṭvā* (four tailed): chin, face, jaws.
10. *China* (eye bandage): eyes, perineum.
11. *Vibandha* (many tailed): back, abdomen, chest.
12. *Vitāna* (Cephaline): scalp.
13. *Gophanā* (Sling or "t" bandage): perineum, chin, nose, lips, scapula.
14. *Pañcāṅgi* (five tailed): temporo-mandibular region, cervical region.
15. *Utsaṅgi* (arm-sling): upper extremity.

Generally wounds are bandaged to prevent infection and to keep dressings in place. Suśruta observed that under the following circumstances bandages should not be applied.[86] It is interesting that his observations hold well even now. According to him, the contraindications for bandaging are as follows: Such wounds as are afflicted by vitiated *pitta,* vitiated *rakta,* trauma, toxins, burns by fire, caustics etc., and gangrenous wounds should not be bandaged, at the initial stage. Now we know that such wounds require proper debridement i.e. removal of the scattered, dead or decomposing tissue and hence bandaging is done only after the healthy granulation tissue makes its appearance.

DIAGNOSTIC METHOD

Suśruta's method of diagnosing a surgical or medical disease, though connected with the humoral theory in general, was not restricted to mere speculations. He has given explicit instructions regarding the 'history-taking' and the physical examination of patients. A patient or his family is to be interrogated concerning the symptoms and the patient's habits ascertained with respect to the causation of the disease. The physical examination of a patient includes the use of all the five senses on the part of the physician, which is basically the same as the method used these days.[87]

As an example of Suśruta's careful observation, it may be mentioned that he inferred the sweetness of urine by observing the affinity of ants and flies towards the patient's urine, while diagnosing diabetes (*prameha*).[88] Similarly, in cases of *praṇaṣṭa śalya.*[89] (foreign body in the tissue) the patient's aversion to the physician's touch of the area where the foreign body was situated would clinch the diagnosis by inference. Based upon the correct diagnosis, the prognostic aspect of the disease was also determined. In case of doubtful or bad prognosis, the patient or their guardians were duly enlightened of the facts, and their consent obtained before doing surgery.

SURGICAL TRAINING

Suśruta happened to be the first surgeon to evolve a sound method of training for his students in surgical skills. He stressed the importance of observation and practical experience in the art of surgery.[90]

He might also have been the first person to advocate dissection of the human body to gain a first-hand knowledge of human anatomy. Though the historians of western science attribute to Hippocrates (370 B.C-450 B.C.) contribution to the evolution of

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modern rational medicine,' it is a pity that Suśruta's contribution in this regard seems to have been marginalized. He has described the dissection of the human body[91] and, based upon his observation, has given a vivid description of all the anatomical parts like skin, membranes, groups of viscera, vital structural and functional components; arterioles; venules, lymphatics and nerves; muscles; ligaments; tendons, bones; joints and vital points or spots Arteries body vitiators; metabolic byproducts (excretory or non-excretory) external orifices and respective passages; network of plexuses, brush-like fibrous or membranous structures (as in the palmar and plantar aponeuroses); back muscles, i.e. erector spinae, sutures as in raphe, clumps of bones making up joints (as in ankle, knee, hip-joint and wrist, elbow, shoulder, pelvis and skull) bony sutures, internal orifices and respective channels, liver, spleen, lungs, caecum, heart, stomach, small and large intestines, and kidneys.

The detailed description of all the above anatomical parts, including their numbers, shape, and arrangement, appears in the *Śarīra-sthāna* (5th to 9th) chapters. The knowledge of applied anatomy of *sirāvyadha* appears in one chapter (8th) and the most important knowledge for a surgeon regarding *marmās* (vital points) is dealt with in another chapter (6th). Suśruta has identified 107 vital spots. A thorough knowledge of these anatomical spots was essential for a surgeon because, any trauma or injury to these spots could lead to shock and various other lesions including death of a patient.

These *vital spots* and their numbers were grouped as follows:[92]

(i) *Sadyaprāṇahara*(instantaneously fatal or fatal up to seven days after a trauma, 19 in number); (ii) *Kālāntara prāṇahara* (fatal after some time i.e. 15–30 days after trauma) 33 in number; (iii) *Visalyaghna* (becomes fatal once the incarcerated foreign body like an arrowhead is removed; 3 in number); (iv) *Vaikalyakara* (not fatal on trauma but incapacitating, 44 in number); and (v) *Rujākara* (not fatal but produces pain; 8 in number).

Structurally these vital spots are made of *māṃsa, sirā, snāyu, asthi,* and *sandhi*. Further, Suśruta, while emphasizing the importance of practice and theory 'compares them to the wings of the bird' and rightly denounces those practising surgery without training, as 'people with half-knowledge' and calls upon the wise people as well the government to condemn such persons.[93]

Before a student of surgery was granted permission to practise on human beings, he was required to attain a sufficient amount of skill in various surgical procedures by constant practice on ingeniously devised experimental models. It may be worth mentioning here that experimental operative surgery was born only in the 16th century in Germany, but Suśruta undoubtedly was a pioneer in this regard. He introduced for the first time a plan for the training of a surgeon to achieve dexterity in performing basic surgical procedures on experimental models[94] (termed *yogyā*). In the absence of animal surgery, these models served well to arouse the interest of the student in basic surgical procedures. A student of surgery used to pick up one procedure at a time and master it by repeated practice on models to obtain proficiency in all the eight surgical procedures within the shortest possible time. The experimental models prescribed to learn these surgical procedures were ingeniously planned by Suśruta and will be described along with the

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eight surgical procedures in the following pages. But it should be noted that, before planning any surgical procedure, one should arrive at a correct diagnosis of the disease and decide whether it is amenable to surgery.[95]

SURGICAL PROCEDURE

Each surgical procedure was a phased programme(*trividha karma*) of three parts.[96] (i) Pre-operative measures (*Pūrva karma*); (ii) Operative measures (*Pradhāna karma*); and (iii) Post-operative measures (*Paścāt karma*).

(i) Pre-operative measures (*Pūrva karma*): Preparation of a patient and keeping ready of the instruments are partly similar to the measures that are essential for safe operation and uneventful recovery. Over and above these measures, Suśruta advocated the following procedures to bring the body to as ideal state of health as possible:

Apatarpaṇaṃ (restriction of diet or starvation)
Ālepaḥ (local application of medicated pigments etc)
Pariṣekaḥ (local irrigation by liquids)
Abhyangaḥ (softening by anointing)
Svedanaṃ (sudation or fomentation)
Vimlāpaṇaṃ (resolution)
Visrāvanam (letting out blood)
Snehanaṃ (internal administration of medicated oils, ghee)
Vamanaṃ (emesis)
Virecanaṃ (purgation)
Upanāhaṃ (poultices for preventing suppuration)
Pācanaṃ (poultices to bring about suppuration)

As for patients who opt for elective surgery, the above procedures, if adopted judiciously, may curtail or prevent the likely complications that may arise during or after the surgery. In a pilot study conducted in the Salya-Sālākya Department of the Institute of Medical Sciences (BHU), Varanasi, it was observed that a majority of patients subjected to pre-operative measures responded better, and had the least disturbances in their water and electrolyte disturbances. They also withstood the operation better and had a smooth post-operative recovery. The total period of hospital stay was shortened by 20 to 30 percent. They showed a rapid recovery and gain in weight.

As regards the preparation of the surgical instruments, they have to be thoroughly cleaned, sterilized and kept ready for use at the time of operation which is to be conducted in a separate *Āgāra* (operation theatre), which should be free from contamination even by direct sunlight and air currents. The principle involved in administering a suitable anaesthesia to a patient, in the pre-operative period, is again a Suśrut's contribution.

Operative Measures

In the 5th and 25th chapters of the *Sūtra-sthāna*, Suśruta has provided detailed descriptions of the main surgical procedures (pradhāna karma) which are eight in number,

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encompassing all types of surgical manouvers. According to the necessity and choice of a surgeon, more than one technique could be followed in the procedure. The diseases amenable to each manoeuvre and technique have also been identified in an appropriate manner.

The eight types of surgical procedures described by Suśruta are as follows.[97]

(i) *Chedanaṃ* (Excision)
(ii) *Bhedanaṃ* (Incision)
(iii) *Lekhanaṃ* (Scraping or curettage)
(iv) *Vyadhanaṃ* (Puncturing or Tapping)
(v) *Visrāvanaṃ* (Drainage)
(vi) *Eṣaṇaṃ* (Probing by sharp probes)
(vii) *Āharanaṃ* (Extraction by sharp hooks etc)
(viii) *Sīvanaṃ* (Suturing)

Further, Vāgbhaṭa added the following five more procedures to the above list :[98]

(i) *Utpātanaṃ* (Paring)
(ii) *Kuṭṭanaṃ* (Pricking)
(iii) *Manthanaṃ* (Drilling)
(iv) *Grahaṇaṃ* (Apposing)
(v) *Dahaṇaṃ* (Cauterization)

(i) Excision: It is indicated[99] in *bhagandra* (fistula in ano); *granthi* (cysts); *tilakālaka* (mole); *arbuda* (tumours); *arśus* (piles, polyps); *carmakila* (warts); *asthimātsaga śalya* (foreign body in bone and muscles); *talupuppuṭa* (epulis); *gala-śuṇḍikā* (elongated uvula); *tuṇḍikeri* (enlarged tonsils) and eleven types of eye diseases. Thus, we see that the non-suppurating hard and fixed lesions and necrosed tissues were subjected to the procedure of excision. To acquire proficiency in excision, students practised this procedure on fruits which were hollow inside.[100]

(ii) Incision: It is indicated in:[101] suppurative lesions like *pakva vidradhi* (abscesses); *pakvagranthi* (cysts when suppurated); *prameha pīḍakā* (carbuncles); *stanaroga* (mammary abscess); *nāḍyoh* (multiple fistulae—with suppuration and discharge); *galavidradhi* (pharyngeal abscess); *pakva-tuṇḍikeri* (tonsillar abscess); *bastyāsmari* (bladder stones); closed wounds with pockets of pus and sinuses; five types of eye diseases..

To acquire proficiency in incision students used to practise it on leather bags and the urinary bladder of dead animals filled with mud or materials of different consistency[102].

(iii) Scraping or curettage[103] **:** It is indicated in *rohini* (diphtheretic patches); *kilāsa* (leuco dermic patches); *upajihvikā* (ranula); *dantavaidarbha* (dental plaques); *granthi* (cysts); *vartmaroga* (diseases of eye-lids); *adhijivhika* (diseases of epiglotis); *arshus* (pile-masses); *mandalakuṣṭa* (certain skin diseases); *māṃasakandi* and *māṃsonnati* (mucous

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and muscular out-growths); *kaṭhina dīryamāṇa* vraṇa (chronic non-healing ulcer); *kaṭhina utsanna māṃsa* (hard muscular out-growths); and nine types of eye diseases. To acquire proficiency students used hides of animals with warty transformation. It was emphasized that the knife should be delicately balanced to avoid injury to the underlying structures.[104]

(iv) and (v) Puncturing or tapping and draining; blood-letting :[105] These two procedures being successively performed are indicated in *sirāvyādhi* (where vene-puncture was indicated); *mūtravṛuddhi* (hydrocele); *dakodaraṃ* (ascites); *vidradhi* (abscess); *śopha* (localised inflammation); *kuṣṭāni* (suppurated skin-lesions); ślīpadam (elephantiasis); viṣaduṣṭa *śoṇitaṃ* (toxic blood); *gala-saluka* (adenoids); *danta puppuṭa* (gumboil), besides fifteen types of eye diseases amenable for *sirāvyadha*; and one disease (*kaphaja liṅganāśa)* matured cataract where a subconjuctival puncture could be done. To acquire dexterity in this surgery, manoeuvres were practised over the veins of dead animals and the hollow stems of lotus.[106]

(vi) Probing by sharp probes is indicated in *Niścalya saśalya nāḍivrana* (sinuses without and with foreign body inside)[107].

This procedure was practised by students on hollow pieces of dry wood, bomoo with holes, Pieces of stones were introduced in the cavities and the students were asked to probe, feel and know the nature of the foreign body, its size, fixity, etc.[108]

(vii) Extraction: This is to be carried out[109] for the removal of tartar from teeth, gravels from the feet and urethra, wax from the ears, impacted foreign bodies, dead foetus, as well as impacted scybala in the anal canal. In order to attain proficiency in this method, students practised the manoeuvre by extracting the teeth of dead animals and seeds from jack fruits. This would help them to appreciate the optimum grip and force required to remove the foreign body, causing the least damage to surrounding structures.[110]

(viii) Suturing[111] is to be done in fresh and clean wounds; wounds near the mobile joints; and those which are not complicated by suppuration but are wide or gaping in nature. After cleaning the wounds of all their foreign matter to avoid suppuration, the sutures are to be put neither too close nor too much apart, without putting any tension over wound margins. Suturing could be of continuous, interrupted, winding or of blanket types.[112] Three types of needles—straight, curved or triangular, have been described to suture the wound.[113] Fine threads or twines are to be used in suturing the tissues;[114] however, intestinal sutures were made by means of *pipīlikā daṃśa*, an organic material. Students should practise this manoeuvre on cloth, silk, leather as the models, for acquiring proficiency.[115]

Vāgbhaṭa, in his *Aṣṭāṅgahṛdaya* (*Sūtra-sthāna*, 26th chapter) has advised the following manoeuvres in addition to Suśruta's description of eight operative measures.[116]

(i) *Utpātanaṃ* (paring) by means of *nakhaśastra*.
(ii) *Kuṭṭanaṃ* (pricking) by *kurca śastra*.
(iii) *Manthanam* (drilling) in hard structures like bone, tooth, etc.

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(iv) *Grahaṇaṃ* (apposing) by teeth of live ants in *chidra udaracikitsā*

(v) *Dahanaṃ* (cauterization) by knife.

Suśruta has highlighted the following points as far as the surgical procedures which were in vogue during his period :

(a) *Niyantraṇaṃ* : To facilitate surgical procedure, the patient should be kept completely under the firm control of the surgeon. It may be noted here that though anaesthesia as a science was not developed at that time, a surgeon required the services of strong persons to hold the patient firmly and subdued.[117] Administration of intoxicating beverages was also advised to mitigate the sensation of pain of surgery.

(b) While performing an incision, a surgeon should thrust the blade of the knife in such a way that the incision should be parallel to the skin crease and not across it, thereby avoiding injury to the vital points, till the level of pus is reached, and immediately the knife should be withdrawn causing minimal damage to tissues. If the pocket of pus is found to be wide, one or two counter incisions may be given.[118]

(c) A surgical wound (done in excision, incision etc) should be sufficiently long, wide, straight, evenly made and with no pockets left inside. It should be made at the appropriate stage of the disease.[119]

(d) Incisions at the region of the eye-brows, temporo-mandibular region, fore-head, eyelids, lips, gums, axilla, abdomen, or inguinal region should be curved (*tiryak*), but not across the tissue.[120]

(e) The incision taken at the hand or foot should be rounded or lunar in shape while rectal and penile incisions should be semilunar in shape[121].

Post-operative Measure[122]

After the completion of a surgical procedure and till the patient is completely cured of the disease, a careful and minute follow—up regarding appropriate bandaging, antiseptic fumigation, dietetics and rest, should be undertaken as post-operative measures. In this context, it goes to the credit of Suśruta (long before Louis Pasteur and Joseph Lister postulated in the 19th cent. A.D.) that contact of flies and formation of maggots in open wounds have been correlated. Hence these should be avoided at all costs by proper bandaging of the wounds to prevent infection.[123] Further, Suśruta as a pioneer, correctly observed and described the mode of spread of infection from person to person. He infered that, by close contact, sexual inter-course, inhalation, ingestion and also by the use of infected objects, infection would spread from person to person and becomes a contagion.[124] Hence these should be guarded against in the patient during the post-operative period of the patient.

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APPENDIX 1

List of Surgical and Para-surgical Operations indicated in *Suśruta saṃhitā* with references

Names of Diseases	*Procedures*
1. *Pakva—vraṇa śopha* (suppurated inflammatory swelling) (Su.Sūtra 17/22 and ci.1/33 to 34)	Pāṭanam:[(*chedanaṃ* (excision), *Bhedanaṃ*, (incision) *lekhanaṃ* (scraping), *esanam* (probing), and *āharaṇaṃ* (extraction)]
2. *Sadyovraṇa* (*chinna, bhinna, viddha, kṣata*) (open wounds), Su.Ci.2 /29 to 66.	*Sivanaṃ-sandhānaṃ* (suturing and aligning the wound margins)
3. (i) *Duṣṭavraṇa* Su.Ci. 1/33 to 35 and 38 to 46) (Acute, sub-acute and chronic ulcers and wounds) (ii) *saśalyavraṇa*: (Su.Ci.2/41 to 43) ulcer/wound with foreign body (iii) *saviṣa vraṇa* (Su.Ci.1/29) toxic wound)	*Rakta-mokṣaṇam*: (blood-letting) *Chedanaṃ* (excision) *lekhanaṃ* (scrapings), *lekhanaṃ* (probing), and *āharaṇaṃ* (extraction)
4. *Pakvavidradhi-bāhya*; and *ābhyantara*; (Su.Ci,16/35 to 40) (suppurated abscess-external and internal)	*Bhedanam, visrāvaṇaṃ* (incision and drainage).
5. *Yāpya arsas* (haemorrhoids) (not amenable to medical treatment) (Su.Ci.6/5 to 7)	*Chedanam* (excision) *kṣāra* and *agni karma* (cauterization by caustics and thermal cauteries).
6. *Nāḍi-vraṇa* (sinus;fissure) (Su.Ci.17/17 to 29)	*Eṣanam* (probing), *chedanam* (excision), *kṣāra/agni,* (cauterization by caustics and thermal cauteries).
7. *Pakva bhagandara* (Su.Ci.8/4 to 11) (Fistula-in-Ano)	*Eṣanam* (probing) *bhedanam* (incision) *chedanaṃ* (excision), *ksāra karma*, (cauterization by caustics) *agnikarma* (cauterization bythermal cauteries).
8. *Pravṛddhaasmari* (chronic vesical calculus and spermolith) (Su.Ci.7/4; Su.Ci.7/29 to 36; Su.Sūtra 25/8)	*basti bhedanaṃ* (incision of urinary bladder), eṣaṇaṃ (probing), and *āharaṇaṃ* (extraction)
9. *Pṛavṛddha śarkarā* (long standing and chronic urinary gravel) (Su.Ci.7/27)	*basti bhedanaṃ* (incision of urinary bladder), eṣaṇaṃ (probing), and and *āharaṇaṃ* (extraction)

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Names of Diseases	*Procedures*
10. *Pakva prameha pīḍakā* (suppurated carbuncles) (Su.Ci.12/4)	*Sirāmokṣa* (venesection), *bhedanaṃ*; (incision), *chedanaṃ* (excision)
11. *Bddhodara* (Su.Ci.14/17) (mid-gut obstruction) *Baddha, gudodara* (low-gut obstruction) (Su.Ci.14/17)	*Pāṭanaṃ, udara bhedanaṃ* (abdominal incision), *āharaṇaṃ* (extraction); *sīvanaṃ* (suturing).
12. *Chidrodaram* (Su.Ci.14/17) (Perforation of gastro-intestinal tract)	*Pātanaṃ* [*udara bhedanam*] (abdominal incision), *pipīlikā damśa,* (intestinal suturing) *udara sīvanaṃ* (suturing of abdominal wall)]
13. (i) *jalodara* (Su.Ci.14/18) (ascitis)	(i) *udara vyadhanaṃ, visrāvaṇaṃ* (paracentesis—abdominis or tapping)
(ii) *yakṛdalyodara* (Su.Ci.14/15) (hepato-megaly)	(ii) *sirāvyādha* (vene section)
(iii) *plīhodara* Su.Ci.14/15 to 16) (spleno-megaly)	(iii) *śirādāha* (cauterization)
14. *pakva vṛddhi* and *medaja vṛddhi* (Ref.:Su.Ci.19/8,10,14,16,17) (linguino-scrotal swelling—inflammatory and non-inflammatory)	*Dārana karma, bhedanaṃ* (incision), *chedanaṃ* (excision)]
15. *mūtraja vṛddhi* (Su.Ci.19/18 to 20) (vaginal hydrocele)	*Vyadhanaṃ* and *visrāvaṇaṃ* (tapping)
16. (i) *Pakva—antra—vṛddhi* (inguinal hernia inflammed)	(i) *bhedanaṃ* and *visrāvaṇaṃ* (incision and drainage)
(ii) *vankṣanastha vṛddhi* (incomplete inguinal hernia) (Su.Ci.19/21,22)	(ii) *agnikarma* (cauterization) ; *sirāvyadhanaṃ* (vene-section)
17. *Pakva galagaṇḍa* (Su.Ci.18/44,50) (inflammed simple goitre)	*bhedanaṃ* and *visrāvaṇaṃ* (incision and drainage)
18. *medaja galagaṇḍa* (Su.Ci.18/53,54) (nodular goitre)	*Pātanaṃ—chedanaṃ* (excision), *lekhanam* (scrapeing) and *sīvaṇaṃ* (suturing,); *agnikarma* (cauterization)
19. *apacī* (Su.Ci.18/25,26) (lympho-glandular swellings)	*chedanam, agnikarma* (excision and cauterization)
20. (i) *pakva granthi* (Su.Ci.18/11) (Inflammed cyst) / aneurysm	(i) *bhedanaṃ, visrāvaṇaṃ* (incision and drainage)
(ii) *Apakva granthi* (Su.Ci.18/24) (Non-inflammed cyst aneurysm)	(ii) *chedanaṃ* (excision) and *agni* (cauterization); *lekhaṇaṃ* and *kṣāra* (scrapeing and cauterization by caustics)

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Names of Diseases	*Procedures*
21. *kaphaja granthi* (Su.Ci.18/14,24) (acquired cysts) aneurysm	*Pātaṇaṃ: (chedaṇaṃ* (excision), *agni* or *kṣāra* (thermal cauterization or caustics)
22. *medaja granthi* (Su.Ci.18/17,24) (sebaceous cysts)	*Pāṭanaṃ*: (*chedanam,* Lekhanam scraping), *agni* or *kṣara* (thermal cuterziation or caustics)
23. *Sādhya arbuda* (vātaja, *pittaja, kaphaja* and *medaja* -Benign tumours) (Su.Ci.18/31,33,35,38,40 to 42)	*rakta visrāvanam* (blood-letting); *dāranam*: (*chedanaṃ* (excision); *lekhanaṃ* (scraping); *sīvanaṃ* (suturing); *kṣāra, agni* (cauterization by caustics/thermal)
24. (i)*Pakva upadaṃśa* (suppurated soft chancre) (Su.Ci.19/38,50)	(i)*bhedanaṃ*; *visrāvanaṃ* (incision and drainage); *agnikarma* (thermal cauterization)
(ii) *Ślīpada* (Su.Ci.19/52,54, 56) (Elephantiasis)	(ii) *Sirāvyadha* (vene-section); *agnikarma* (thermal cauterization)
25. *valmīka* (Su.Ci.20/48 to 50) (Actinomycosis)	*rakta-visrāvaṇaṃ* (blood-letting) *chedanaṃ* (excision) , *ksāra*, (use of alkali) *agni* (thermal cauterization)
26. (i) *Chippa* (acute paronychia); (ii) *kunakah* (claw-nails) (Su.Ci.20/9 to 11)	*rakta-visrāvaṇaṃ* (blood- letting); *chedanaṃ* (excision), *agni* (thermal cauterization).
27. *Śarkarārbuda* (Su.Ci.20) (sebaceous cyst with horn formation)	*chedanaṃ* (excision), *agni, kṣāra* (cauterization-thermal or by caustics)
28. (i) *Kadara* (corn), *tilakālaka-maṣaka, jatumaṇi* (moles) (Su.Ci.20/23,32)	(i) *utkartanaṃ, chedanam* (excision), *agni* or *kṣāra* (cauterization thermal or by caustics).
(ii) *nyaccha-vyaṅga-nīlikā* (naevii)	(ii) *rakta visrāvaṇaṃ* (Su.Ci.20/33) (blood-letting)
29. *Netra-vartma vyādhi* (diseases of eye-lids) (i) *Arśovartma; suskarśa* (trachomatous papillae, follices); *vartmārbuda* (Su.uttara.15/29 to 33); (lid-angiomas /tumours)	(i) *chedanaṃ*(excision), *lekhanaṃ* (scrapeing) *agnikarma* (thermal cauterization)
(ii) *pakṣmakopa* (Su.uttara 16/3 to 8) (trichiasis, dis-trichiasis, entropion)	(ii) *utkartanam: chedanaṃ* (excision), *sīvanam (*suturing) *agni* or *kṣāra* (cauterization -thermal or by caustics)

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Names of Diseases	*Procedures*
30. (a) *Netra śukla-gata vyādhi* (diseases of conjuctiva) (i) *Sirāja pīḍaka*(deep scleritis) (ii) *Sirājāla* (epi- scleritis) (iii) Five types of *arma* (pterygium) (b) *Parvaṇikā* (margina keratitis) (Su.Uttara, 15/3 to 13; 20 to 24)	*chedanaṃ* (excision)
31. *Netra vartma* and *netra sandhigata vyādhi* (diseases of eye-lids and their junctions) *ślesmopanāha -vartma* (lachrymal cyst) *lagaṅa-vartma* (meibomian cyst) *bisavartma* (benign neoplasm) *kṛmija granthi-sandhigata* (pediculi ciliaris) *anjananmika-vartmagata* (external stye) (Su. Uttara, 14/3 to 11)	*bhedanaṃ* (incision)
32. *Netra vartma vyādhi* (diseases of eyelids) *utsaṅginī*(chalazion), *bahalavartma* (multiple stye or chalazion), *kardamavartma* (squamous non-ulcerative blepharitis), *syāva-vartma* (ulcerative blepharitis), *baddhavartma* and *kliṣṭavartma* ((oedematous lids), *Pothaki* (infiltrative trachoma) , *kumbhikini* (internal eye), *vartma-śarkara* (granular lids/ follicular trachoma) (Su.Uttara, 13/3 to 15)	*lekhanam* (scraping)
33. (Other eye diseases) a. *Kaphajā linganāśa* (matured cataract) (Su.Uttara, 17/55 to 70)	a. *vyadhanaṃ* and *lekhanaṃ* (subconjunctival puncture and discission of lens followed by scraping
b. *Śirotpāta* and *sirāharṣa-sarvagata* (conjunctival hyperaemia and cellulitis) *saśopanetra pāka-sarvagata* (pan ophthalmitis) *aśopha netra pāka-sarvagata* (Phthisis bulbi) *puyalasa-sandhi gata* (dacryo-cystitis) *vātaviparyaya* and *anyatovāta-sarvagata* (nerve-atrophies) four types of *adhimantha-sarvagata* (glaucoma) four types of *abhiṣyanda-sarvagata* (conjuctivitis) (Su.Uttara, 9/3,10/3,11/3,12/4,45, 17/55 to 70)	b. *sirāvyadhanaṃ* (venepuncture) (only when medical treatment fails)
c. *kukoonaka* (trachoma; follicular conjuctivitis) Su.Uttara 19/10	c. *jaloukāvasecanam* (leeching) *pratisaranam* (dusting by powders) *lekhanaṃ* (scraping)

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Names of Diseases	*Procedures*
34. *Tālupupputa*(epulis) *galā-śunḍikā* (elongated uvula) *adhuruṣa* (inflammed palate); *tuṇḍikeri* (enlarged tonsils) *kacchapa* (sarcoma) (Su.Ci.22/50 to 57)	*chedanaṃ* (excision)
35. *Galavidradhi* (pharyngeal abscess), *pakvatālupuppuṭa*(suppurated epulis); *pakva tuṇḍikeri* (suppurated tonsils); *gilāyu* (cyst); *śaluka*(adenoids); (Su.Ci. 22/66,67,57,64) *danta-puppuṭa* (gum boil) Su.Ci.22/66,67	*bhedanaṃ* and, *visrāvaṇaṃ* (incision and drainage)
36. *Rohiṇi* (diphtheria), *upajihvikā* (ranula), *adhijivhikā* (inflamed epiglottis) *danta-veṣhṭaka* (pyorrhoea), *Dantavaidarbha* (gingivitis), *jihvākaṇṭaka* (glossitis) (Su.Ci.22/60,65,13,14)	*lekhanaṃ* (scraping) *rakta-mokṣaṇaṃ* (blood-letting)
37. *Danta-nāḍi* (dental sinus) *Adhidanta* (extra tooth): *kṛmi danta* (caries) (Su.Ci.22/26 to 28)	*eṣaṇaṃ* (probing) *chedanaṃ* (excision), *kṣāra, agni* (cauterization) *danta-uddharaṇaṃ* (extraction of tooth)
38. *Acetana* (*mṛta*) *mūdha garbha*(foetal-death) (Su.Sū., 25/11; (Su.Ci.15/9,12,13)	*bhedanaṃ* (incision); *chedanaṃ* (excision); *āharaṇaṃ* (extraction); *mūdha-garbha dāranaṃ* (embryo-tomy)
39. *Praṇaṣṭa śalya* (impacted foreign-body) (Su.Sū., 25/11;27/6)	*bhedanaṃ* (incision); chedanam (excision) *āharaṇaṃ* (extraction)
40. *karṇa, nasa, oṣṭha, vikṛtis* (torn and defective ear, nose and lip) (Su.Sū., 16/9 to 17; 49 to 54)	*sīvanaṃ* and *sandhānaṃ* (suturing and repair), *karṇa-nasa-oṣṭha bandha* (ear-plasty, rhinoplasty and labio-plasty.

Note: In the references the first numeration refers to the chapter number and the second as well as the subsequent ones, to the verse numbers (example: 22/50 to 57; 22 is the chapter number and 50 to 57 refer to the verse numbers. *Ci* = *cikītsāsthāna; sūtra-Sūtra sthāna; Uttara* = *uttaratantra* of the *Suśruta saṃhitā* (SS). Aṣṭ. Hṛ = *Aṣṭānga Hṛdaya*.

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8. *Mādhavanidāna* with *Madhukosa* Com: 41.1 and SS.Sūtra. 17.3.

9. SS.Ci. 2.4.

10. SS.Sutra. 26th and 27th chapters.

11. SS.Ci. 1.8.

12. SS.Sūtra. 12.15 to 18.

13. SS.Sūtra. 12.29 to 31.

14. SS.Sūtra. 14.39 to 42.

15. SS.Ni. 15.17.

16. SS.Ni. 15.4.

17. SS.Ci. 3.14.

18. SS.Ni. 15.6.

19. SS.Ni. 15.9.

20. SS.Ci. 3.15 and 69; SS. Ni. 15.12 to 15.

21. SS.Ci 3.3 with Ḍalhaṇa commentary.

22. SS.Ci. 3.6; 17 to 18.

23. SS.Ci. 3.9 to 10.

24. SS.Ci. 3.34.

25. SS.Ci. 3.48.

26. SS.Ci. 3.14.

27. SS.Ci. 3.35.

28. SS.Ci. 3.30.

29. SS.Sūtra. 16.10.

30. SS.Sūtra. 16.49 to 53.

31. SS.Sūtra 16.54.

32. SS.Ci. 1.81 to 87.

33. SS.Sūtra. 11.12.

34. SS.Sūtra. 11.7.

35. SS.Sūtra. 12.1.

36. SS.Sūtra. 12.9 to 10.

37. SS.Sūtra. 12.4.

38. SS.Sūtra. 14.34.

39. SS.Śā. 8.25 to 26.

40. SS.Śā. 8. 22 to 23.

41. SS.Śā. 8.17.

42. SS.Ci. 19.52.

43. SS.Ci 19.55

44. SS.Ci. 19.56.

45. SS.Sūtra. 13.10.

46. SS.Ci 1.30.

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47. Ast. Hr.Sūtra. 26.44.
48. SS.Sūtra. 13.3.
49. SS.Sūtra. 14.26.
50. SS.Ci. 1.29.
51. SS.Sūtra, 7th and 8th chapters.
52. SS.Sūtra. 7.3.
53. SS.Sūtra. 8.8.
54. SS.Sūtra. 8.14.
55. SS.Sūtra. 8.3 to 4.
56. SS.Sūtra. 8.3 to 4.
57. SS.Sūtra. 8.3 to 4.
58. SS.Sūtra. 8.3 to 4.
59. Aṣṭ. Hr.Sūtra. 26.13, 26. and SS. Uttara 17.59.
60. SS.Sūtra. 25.10 and SS. Uttara 8.11.
61. SS.Uttara 8.11
62. SS.Utara 8.4 and A. Hr. S 26.17, 22,23.
63. SS.Sūtra. 8.4 and SS.Sutra. 25.23 to 25.
64. Aṣṭ. Hr.Sutra. 26.30 to 32; SS.Sū. 8.5.
65. SS.Sūtra. 8. 15 to 32.
66. SS.Sūtra. 8.15 to 18.
67. SS.Sūtra. 7.3 to 8.
68. SS.Sūtra. 7.10.
69. SS.Sūtra. 7.11.
70. Aṣṭ. Sangr. 34 and A. Hr.Sūtra. 25.8 to 9.
71. SS.Sūtra. 7.12.
72. SS.Sūtra. 7.13 to 14.
73. Aṣṭ. Hr.Sūtra. 25.13,16; 18 to 22.
74. SS.Sūtra. 7.15
75. Aṣṭ. Hr.Sūtra. 25.32 to 33; 35.
76. SS.Sūtra. 7.16.
77. Aṣṭ. Hr.Sūtra. 25.40.
78. SS.Sūtra. 36. 3 to 11 and SS. Ci 1.14.
79. *Nibanda saṅgrah* a Commentary on *Suśruta saṃhitā*; SS.Sūtra. 5.2 to 3.
80. SS.Sūtra. 18.18 to 19.
81. Aṣṭ. Hr.Sūtra. 29.60.
82. SS.Sūtra. 18.23 to 34.
83. SS.Sūtra. 18.17.
84. SS.Sūtra. 18.36.
85. SS.Sūtra. 18.19 and Ast. Hr.Sūtra. 29.60.
86. SS.Sūtra. 18. 33 to 34.
87. SS.Sūtra. 10. 4 to 6.
88. SS.Ni . 6.15.
89. SS.Sūtra. 26. 14 to 17; SS.Sūtra. 35. 54 to 55 and SS. Ci. 7.28 to 29.
90. SS.Sūtra. 3.47.
91. SS.Sha. 5/61 to 63.
92. SS.Śā. 8. 16 to 24.
93. SS.Śā. 3. 48 to 51.
94. SS.Sūtra. 9. 3 to 6.
95. SS.Sūtra. 24. 3.
96. SS.Sūtra. 5.3 to 19 and 19. 3 to 37; 17.16 to 17

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97. SS.Sūtra. 5.5.
98. Ast. Hr.Sūtra. 26.28.
99. SS.Sūtra. 25.3 to 4; Ci, 1. 33 to 34 and SS. Uttara 15.
100. SS.Sūtra. 9.4.
101. SS.Sūtra. 25.5 to 8; Ci; 1.34 and SS. Uttara 14.
102. SS.Uttara 9.4.
103. SS.Sūtra. 25.9; Ci. 1.38 and SS. Uttara 13.
104. SS.Sūtra. 9.4.
105. SS.Sūtra. 25.10. 12 to 15.; SS.Ci. 1/44; SS. Uttara. 9,11,12,17/55 to 60.
106. SS.Sūtra. 9.4.
107. SS.Sūtra. 25.10 and SS. Ci 1.41.
108. SS.Sūtra. 9.4.
109. SS.Sūtra. 25.11 and Ci. 1.43.
110. SS.Sūtra. 9.4.
111. SS.Sūtra. 25.16 and Ci. 1.45.
112. SS.Sūtra. 25.26 and Ci 1.45.
113. SS.Sūtra. 25.23 to 25.
114. SS.Sūtra. 5.6 and Ci. 14.17.
115. SS.Sūtra. 9.4.
116. Ast. Hr.Sūtra. 26.28.
117. SS.Sūtra. 5.7 and 17.16 to 17.
118. SS.Sūtra. 5.7; SS. Sūtra 17.16 to 17.
119. SS.Sūtra. 5.9.
120. SS.Sūtra. 5.13.
121. SS.Sūtra. 5.14.
122. SS.Sūtra. 5.17; 19.4, 6, 12 and 19.
123. SS.Sūtra. 18.30.
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CHAPTER 6

Śālākyatantra
Diseases of Supra-clavicular Parts

Manjusha Rajagopal

ŚĀLĀKYA

Śālākya, one of the important branches of Ayurveda, has a second place in the *Suśruta Saṃhitā* and a major portion of *Uttaratantra* of this text is devoted to this speciality. Vāgbhaṭa, another celebrity in the field of Ayurveda, has named it *Ūrdhvāṅgacikitsā*.

Śālākya is defined as a branch concerned with the diseases of the parts above the shoulder, i.e., the ear, eye, mouth, nose etc. The experts in this branch of Ayurveda are known as *Śālāki*. It is also known as *Ūrdhvāṅgacikitsā,* since the head is considered as *uttamāṅga* or the best part of the body owing to its association with the vital centres and all the sense organs (Ca.sū.17). The groups of diseases under this branch in modern medical parlance are:

i. Diseases of the eye—ophthalmology.
ii. Diseases of the ear, nose and oral cavity as a whole—ENT and dental science.
iii. Diseases of the head—a part of general medicine.

In this chapter, the word *Śālākya,* has been used instead of any modern medical term, since the former has a much wider connotation. Likewise, the technical words in Sanskrit used by Suśruta and others have been maintained, giving as far as possible their meaning or equivalents in English from the modern standpoint.

In the *Ṛgveda* there is a description of the successful ophthalmic operations carried out by Aśvinīkumāras (the divine twin brothers). There is also a reference to the donation of eyesight (*dṛṣṭidāna*) to the blind *Paravṛja* by Indra (RV. I.112.8). There is an allusion too in respect of transplantation of the head by Aśvinīkumāras which they are stated to have learnt from Dadhīci (RV. I.116-12; I-117-22; I-119-9). In addition to this, the treatment of deafness of the son of one Nṛṣada is also mentioned (RV. I.117-8). Lord

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Indra is stated to have cured the baldness (*khālityaroga*) of the father of Apala. In the Yajurveda also, there are passages concerning the restoration of eyesight.

The *Atharvaveda* gives the origin of the organs of the body, their anatomy and functions in general (AV. 10-2-33); seven apertures of the skull and the position of the eye (AV. 10-2-29, 10-8-9); sites of diseases, viz. eyes (*akṣi*), nose (*nāsika*), ear (*karṇa*), chin (*cibuka*), head (*śirṣa*), brain (*mastaka*), tongue(*jihvā*), and neck (*grīva*) (AV. 2-33-1to7) have been mentioned.

Different collyria are mentioned for the treatment of eye diseases. The collyrium was generally made of antimony sulphide, for which the words mentioned in the *Ṛgveda* are *parvateyaṃ*, *yāmunaṃ* and *yānuneyaṃ* indicating their origin in the mountainous region of the Himalayas. Besides mentioning the *añjanas*, the *Aitareya Brāhmaṇa* also mentions the disease, lymphadenitis (*gaṇḍamālā*), a disease of the neck region, and its treatment with the application of a paste of conch (*śaṅkha*), and blood-letting by leeches (*jalauka*). The internal use of oil for curing the disorders of *vāta* and *pitta*, the use of honey for disorders of *kapha,* and clarified butter for filling in the nose, are also mentioned. As for the magico-ritual aspects, the *Atharvaveda* has some *mantras* to be chanted for curing or treating blindness. (6.98-4; 6.16.1-4).

An *upaniṣad* called *Cākṣuṣopaniṣad* or *Netropaniṣad* with about forty verses is still extant. It relates how the worship of the sun preserves the eyesight. The two eyes are called Viśvāmitra and Jamadagni in the *Bṛhadāraṇyakopaniṣad,* which are said to be in two of the seven cavities of the head, containing vessels and having white (*śveta*) and black (*kṛṣṇa*) portions as well as internal canthus (*kanīnīka*), and other details (11.2.2).

This *upaniṣad* also refers to the deities in respect of the parts of the eyes: (i) Āditya, the Lord of the internal canthus (*kanīnīka*); (ii) Agni, the Lord of the black portion (*kṛṣṇa maṇḍala*); and (iii) Indra, the Lord of the white portion (*śuklabhāga*). The five elements viz. Earth, Water, Fire, Air and *Ākāśa* are said to play their role in the formation of the eye.

AYURVEDIC LITERATURE ON ŚĀLĀKYA

Three important Ayurvedic texts, viz. the *Suśruta saṃhitā*, the *Caraka saṃhitā* and the *Aṣṭāṅgasaṅgraha* of Vāgbhaṭa as well as the *Aṣṭāṅgahṛdaya,* (a concise version of *Aṣṭāṅgasaṃgraha*) have dealt with *Śālākya tantra* in detail. In the *Suśruta saṃhitā,* the stress is more on general surgery (*Śalya*) whereas in Caraka saṃhitā it is on therapeutics (*Kāyacikitsā*). Caraka regards Dhanvantari as an authority of *Śālākya* while Suśruta regards Ācārya Nimi as his guide and says that he follows his tradition (*nimiparampara*). Among the other traditional authorities on ophthalmology are Aśvinau, Bhoja, Gārgya and Gālava. Caraka also mentions Janaka, King of Videha; he and Vāgbhaṭa, allude to Nimi, the King of Videha (Ca. Śa.VI.21,XVI.8). In addition Kankāyāna, a sage of the *Atharvaveda*, is also referred to both by Caraka and Dalhaṇa, the commentator of the *Suśruta saṃhitā*, as an authority on ophthalmology.

Nevertheless, several works of repute on *Śālākya* are not extant. However the following works are worthy of mention:

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(i) *Suśruta saṃhitā*; (ii) *Caraka saṃhitā*; (iii) *Kaśyapa saṃhitā* (incomplete); (iv) *Hārīta saṃhitā* ; (v) *Aṣṭāṅgasaṅgraha*; (vi) *Aṣṭāṅgahṛdaya*; (viii) *Bhāvaprakāśa saṃhitā*; (ix) *Yogaratnākara* ; (ix) *Śārṅgadhara saṃhitā* ;(x) *Gadanigraha*; and (xi) *Cakradatta*. It may, however, be noted that, while treating the subject all the writers follow Suśruta's method. There is one more text, called the *Videhatantra* or *Nimitantra* (not available). Nimi who preceded Suśruta seems to have set a model to Suśruta on *Śālākya* and he is stated to have specialized in diseases related to the eyelids; *nimeṣa*, an eye disease, is named after him. The Rāmāyaṇa refers to Nimi along with Janaka, the king of Videha, while, one Karala Janaka is said to be Nimi's son according to Buddhist works. Nimi, Videha and Janaka appear to be the names of the same person.

Sātyakitantra : Sātyaki, a celebrity in Śālākyatantra, is referred to in the commentary of Dalhaṇa, *Nibandhasangraha*, Vijayarakṣita's commentary entitled *Madhukoṣa vyākhyā* on *Mādhavanidāna,* and of *Srikaṇṭhadatta*. *Sātyakitantra* was an established text during the period of commentaries. The Sātyaki school was also noted for the invention of surgical treatment to cure mature cataract (*śleṣmikalinganāśa*), which is close to modern surgery and it was in practice until recently. There is an other documentary evidence confirming the practice of Sātyaki's method in Bombay, Nagpur and Uttar Pradesh (*Abhinavanetra-cikitsā-vijñāna,* p.22). In the disease called *sannipātaja timira* when there is vitiation due to the predominance of *pitta* and *rakta,* the hue of the lens would be yellow, and if the lens is affected by *tridoṣas,* the lens would have variegated colours (Su.utt.25). The word, *timira*, connotes a specific eye disease (refractive errors) and its causative factors, varieties and their curability or otherwise have been dealt with.

Śaunakatantra : Ḍalhaṇa, the commentator of *Suśruta saṃhitā* and Carkrapāṇidatta, the commentator of *Caraka saṃhitā* refer to one Śaunaka while dealing with *Śālākyatantra*. Although it is hard to establish his identity, it is believed that he was the son of Śunaka and the grandson of the Vedic sage, Gṛtsamada. He was one of the sages who assembled in the foothills of the Himalaya with a view to finding out cures for varied diseases that afflicted people then, according to Caraka (Sū.I.8-14).

Karala tantra : Also known as *Karāla bhadra tantra* and *Karālabhaṭṭa tantra* and written by Karalabhadra or Karala ṛṣi, this work enumerates 96 ocular diorders (*netrarogas*) as substantiated by Cakrapāṇidatta. Karala perhaps belonged to the Janaka dynasty of Videha and significantly, Śrīkanṭhadatta, the commentator on *Mādhavanidāna*, calls him Karala Janaka.

Kṛṣṇātreya tantra : The identity of Kṛṣṇa Ātreya, the author of this work, is a disputed issue. Śrīkanṭhadatta and Śivadāsa, the commentators, refer to Kṛṣṇa Ātreya only which shows that Kṛṣṇa Ātreya is different from Punarvasu Ātreya, the preceptor of Agniveśa, the author of *Agniveśa tantra* redacted by Caraka; both the Ātreyas could be one and the same.

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Bhoja Prabandha* or *Bhojatantra* or *Bhojasaṃhitā : King Bhoja is presumed to be the author of this work dealing with *Śālākya* and Ḍalhaṇa, the commentator, confirms this. According to the commentators it was then a great work on *Śalya-śālākya.*

Cākṣuṣyatantra : It is believed that this text is an independent work on *Śālākyatantra.* In any case, it is mentioned in *Madhukośaṭīkā* and in *Gadanigraha,* and is referred to while dealing with headache due to depletion of tissues.

Kaṅkayāna tantra : This work is not extant, but Caraka and Ḍalhaṇa have given quotations from this work. *Gārgyatantra*, another work on *Śālākya,* is also mentioned in Ḍalhaṇa's commentary while dealing with the eye and its diseases.

Bhṛgu tantra : Bhṛgu, an ophthalmologist, seems to have written on refractive errors (*timira*), tumour of the eye (*pāṭalārbuda*) and corneal ulcer (*śukra*) according to different sources . The work, however, is not extant.

Karavīrya tantra : Karavīrya, a disciple of Dhanvantari, is stated to have been associated with Suśruta. This work is available only in some quotations here and there.

Gopurarakṣita tantra : This is a work available only in the form of quotations of some disciples of Dhanvantari.

Bhālukī tantra : The work is not extant, but Suśruta refers to one Bhāluki while describing surgical instruments.

Aupadhenava tantra : The work is mentioned in Ḍalhaṇa's commentary.

Caraka saṃhitā : This redacted work of *Agniveśa tantra* is deemed to be the oldest *Saṃhitā* but it does not deal with *Śālākya* elaborately. Recipes for nasal medication (*nāsya rogas*) are given here for ocular disordes. However, Caraka's advice is to refer to the texts of *Dhanvantari sampradāya* (Suśruta) in respect of Śālākya.

Suśruta Saṃhitā : The *Uttaratantra* of *Suśruta saṃhitā*, an authentic work on *Śālākya*, is mainly devoted to the diseases of eye, nose, ear and head. The *Nidānasthāna* and *Cikitsāsthāna* of this compendium describe the diseases of oral cavity (*mukha*) including throat. Some believe that *Uttaratantra* is a later addition which does not seem to be correct for the following reasons.

i. Not only topics related to Śālākya but all the other topics which are not covered in other sections (*sthānas*) are covered in *Uttaratantra*;
ii. Had it been written by some other person, he would have described the diseases of oral cavity separately, but there is no repetition in the present available work;
iii. In the first chapter, *Śūtrasthāna*, Suśruta says that the rest of the topics will be covered in *Uttaratantra* after 120 chapters in five sections.

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Aṣṭāṅgasaṅgraha and *Aṣṭāṅgahṛdaya*: These two works form the third component of the triad of Ayurvedic texts. Vāgbhaṭa, the author, covers all the eight branches of Ayurveda. *Mādhava nidāna* (8th century); *Cakradatta* (12th century); *Śārṅgadharasaṃhitā* (13th century); *Gadanigraha* (15th century); *Bhāvaprakāśa* (16th century); and *Yogaratnākara,* (17th century), are the other texts which are of value in the context of *Śālākya tantra.*

The number of diseases of supra-clavicular region dealt with in the aforesaid works with slight variations, are as follows:

i. Diseases of the eye (*netraroga*) -96
ii. Diseases of the ear (*karṇaroga*)- 26
iii. Diseases of the nose (*nāsaroga*) -18
iv. Diseases of oral cavity (*mukharoga*)-75
v. Diseases of the head (*śiroroga*)-10
vi. Diseases of the scalp (*kapālagatoroga*)- 7

Although the aforesaid texts follow Suśruta while dealing with *Śālākya*, in the *Cakradatta,* several new combinations of drugs have been given including about 30 new combinations for nasal medication (*nāsya*). In the *Bhāvaprakāśa* and *Yogaratnākara* also certain new combinations of curative medicines have been given.

ANATOMICAL CONSIDERATIONS IN ŚĀLĀKYA TANTRA

Of the five sense-organs, according to Ayurveda, with the exception of the tactile sense (skin), the other four are in the head and they are considered to be structural entities as well as sites of sense organs, their sensory centres being located in the brain. Except the anatomy of the eye, the descriptions of the ears, nose, and oral cavity are very brief. But, surprisingly, the signs and symptoms of diseases affecting the various parts of sense organs are quite apt.

Anatomy of the eye

The organ of sight is variously called *akṣi, cakṣu, dṛṣti, netra, nayana, locana* and the like. *Cakṣus* is the word used by Caraka for eye generally, while Suśruta does not use this word at all. The *Caraka saṃhitā* in which human anatomy has not been discussed in detail, regards *śiras* (head) as the best (*uttamāṅga*) among all the other parts of the body of every living being, since all the sense organs (*indriyas*) are situated in it (*Sū*.17/3). It has been stated that the eye sockets (*netraguhās*) are the shelters of the eyes with one faculty, viz. vision, and these are the two among the seven openings of the head (*Sū*, 7/12). Suśruta and his followers, like the authors of *Bhāvaprakāśa* and *Yogaratnākara,* have not given any anatomical descriptions. But it is only Suśruta who describes the eyes separately.

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According to Suśruta, the sense organ, the eyes, is a physiological phenomenon while *dṛṣṭi* is vision (*netrakriyā*) (*utt.* 6/20). The lens is called *dṛṣṭimaṇi* and the pupil *dṛṣṭimaṇḍala*, an anatomico-physiological entity. The body is made of five elements (*pañcamahābūtas*) with each organ being formed by their particular combination. The constitution of different coloured portions of the eyes, as mentioned by Suśruta, is as follows : (i) Flesh (*pṛthvī*); (ii) White (*jala*); (iii) Red (*tejas*); (iv) Black (*vāyu*) ; and (v) *Srotas* (*ākāśa*) (*Su.ut.*1/11-12).

Futher, he describes the role of *tridoṣas* in determining the colour of the eyes. *Tejas* with blood (*raktadhātu*) results in *raktākṣa* (red eyes); *tejas* with *pitta* results in dark-brown eyes (*piṅgalākṣa*) and *kapha* results in pale eyes (*śuklākṣa*). (Su. Su.2/35). Vāgbhaṭa, on the other hand, has stated that the white part of the eyes (*śuklamaṇḍala*) is due to *kapha* and is of paternal origin (*pitṛabhava*), while the black part of the eyes (*kṛṣṇamaṇḍala*) is due to the blood and is of maternal origin (*maṭrjabhāva*). Together they form the pupillary area (*dṛṣṭimaṇḍala*). The colour of the eyes depends on ones constitutional variations and enables a physician to identify the *doṣas* in their early stages. *Nayana budbuda,* round and soft like a bubble floating on water, is the word used by Susruta to indicate the shape of an eye. Another shape of an eye is called *goṣṭanākāra*, an eye like the teat of a cow, thus suggesting a soft eyeball, since it looks like a cow's teat when the eyeball is taken out of the eye along with the extra-ocular muscles. Suśruta must have observed this while dissecting a cadaver's eye.

It is significant to note that Suśruta uses the finger as a unit of measurement which is equal to the central part of one's thumb. The thickness of the antero-posterior diameter of an eyeball (*bāhulya*) is two *aṅgulas* and the circumference of the eye is two and a half *angulas*. Also the thickness of each layer of the eyeball (*pāṭala*) is 1/5 of the pupil (*dṛṣṭimaṇḍala*). The coats or layers of the eyeball are too small to be measured (Su utt. 1.4). Anatomically Suśruta has divided the eye into three parts: circles (*maṇḍala*), layers (*pāṭala*) and junctional areas (*sandhi*), and in relation to them he has enumerated as many as 76 disorders.

Circles of the eye (maṇḍala)

Among the circular structure of the eye or 'circles of the eye', *pakṣma maṇḍala* is the outermost circle of the eye formed by the eyelashes (*pakṣma*). When observed grossly, this circle is strictly not circular but elliptical and is apparent only when the lids are open. The upper and lower lids jointly form a circle in front of the eyeball called *vartmamaṇḍala*. There are two vessels (*nimeṣinī siras*) for the blinking action (*nimeṣa* and *unmeṣa*). (*Su.utt.*3/75). Eyelashes and eyelids are extra-ocular parts while *sveta* (white) *kṛṣṇa* (black) and *dṛṣṭi* (vision) *maṇḍalas* are ocular structures. The white part is the scleral part of the outer and the fibrous coat of the eyeball, covered with bulbar conjunctiva. Though the white part refers to the sclerotic area, the conjunctival sac also should be included in the sclera when we consider the diseases of the white part of the eye given in the texts.

The white part has connections with the eyelids and the black part (*Su.utt.*1/16) and this is in accordance with modern description. The black and anterior- most circle of the

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eye is the black part of the eye which is one third of the visible part of the eye-ball rather than the eyeball as a whole. The black and white parts of the eye have a continuation with one another at the corneo-scleral junction or the limbus. Thus the black part seems to be the corneal part of the eyeball. This structure is not actually black in colour, but due to reflection of the iris lying behind, through the transparent cornea, it looks black. The diseases of the black part, as given by Suśruta, compare well with the descriptions of corneal diseases of modern times.

Suśruta uses the word *tāraka* for the eye structure which is one third of the apparently visible whole of the eyeball (*Su.utt.*35.12). According to Ḍalhaṇa, it is the black part of the eye. *Tāraka* means a star implying the twinkling of the eye like a star. One ninth of this is *dṛṣṭimaṇḍala*, and hence it is slightly larger than the cornea and black in colour . The iris which is a black structure, constricts and relaxes due to its muscular activity and is attached to ciliary body about 1.5 mm. beyond the corneo-scleral junction. Therefore *tāraka* seems to be the iris part of the eyeball and *kṛṣṇamaṇḍala* may be considered as the cornea plus iris. By this consideration other structures like *dṛṣṭimaṇḍala* situated in *kṛṣṇamaṇḍala kṛṣṇadṛṣṭisandhi* can be explained on modern lines of anatomy.

The pupil enclosed by the iris part of the *kṛṣṇamaṇḍala* is *dṛṣṭimaṇḍala*. The central free border of the iris is in contact with the lens portion and behind it is *kṛṣṇa-dṛṣṭi-sandhi*. Lid margins on which the eyelashes grow, is called *pakṣmavartmasandhi* whereas the bulbar fornicas (upper and lower) where the lids and sclera appear to be meeting, is *vartmaśuklasandhi*. This *sandhi* in the upper lid can only be seen by everting the lid. More precisely, it is the reflection of the bulbar conjunctiva on to the palpebral conjunctiva. The *kanīnikā* and *apāṅga sandhis* are the nasal and temporal canthi respectively. The last and the innermost circular structure of the eye which has the faculty of vision is named the pupillary area (*dṛṣṭimaṇḍala*). In size, it is one-seventh of the black portion as stated by Suśruta, which is also the view of Videha, according to Ḍalhaṇa. This is also stated to be one-ninth of the *tāraka*.

In the *Suśruta saṃhitā, dṛṣṭi* is used for conveying different meanings in different contexts. For example, in the *Sūtrasthāna* (12/9), Suśruta warns that *dṛṣṭi* should be covered with water-soaked gauze on the lids before doing diathermy (*agnikarma*). *Dṛṣṭi* here means eyeballs. In the first and seventh chapters of *Uttaratantra, dṛṣṭi* is used to mean pupillary area which, as noted before, is one-seventh of the black part and one-ninth of the *tāraka*.

According to Suśruta, the *dṛṣṭimaṇḍala* encloses in it the *dṛṣṭi* (vision) with the following characteristics: (i) *Masūradalamātraṃ*—It is of the size and shape of a *masūradala* (leguminose family). His description fits into the description of lens by modern opthalmologists as the *masūradala* is convex on one side and a little flat on the other side; (ii) *Vivarākṛtiḥ*- (hollow); (iii) *Khadyota-Visphulingābhaṃ* having the shine of the glow of a fire-fly; and (iv) *Āvṛtam-paṭalmakṣṇa-bāhyam* covered by an external layer.

As regards the diseases of the black part of the eye, it has been stated (*Su.utt.*5/5) that the prognosis of a corneal ulcer (*savraṇa śukla*) would be better when it is situated away from the *dṛṣṭi* which is the central part of the black area in front of the pupil where

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ulcer heals slowly, but results in opacity and blocks the vision. In the prognosis of glaucoma (*adhimantha*) it is pointed out that, if it is not treated well in time, it destroys vision (*dṛṣṭi*). The word *dṛṣṭi* here is used for *pāṭala*-a site of *timira-liṅganāśa* complex.

Dṛṣṭi , the anatomico-physiological entity, has two aspects according to Ayurvedic texts: (i) *netrakriyā* or vision (*Su.utt.*6.20), disorders of vision involving all parts of the eyes including: retinal diseases, those of the choroid, disturbance in physiology of vision, etc; and (ii) *dṛṣṭimaṇi* or *dṛṣṭimaṇḍala* (*Su.utt.*1.3) which includes diseases of the lens.

Paṭala (layers or coats of the eyeballs)

Each eyeball has six layers surrounding it according to Suśruta. Two of them are external (*bāhya*) and four are internal coats (*abhyantara*) inwards from outside. The *timira* (blindness) disease occurs in them. (*Su.ut.*7.4). Like *dṛṣṭi, paṭala* is also used differently in different contexts. Suśruta has described the prognosis of *timira* as a disease of the *dṛṣṭimaṇḍala* and thus *paṭala* is taken only as a criterion while describing *timira.*

The first layer covers the pupil from outside, and the cornea and the sclera show their appearance, especially the former, for the following reasons according to Suśruta: (i) the first layer is *tejo-āśrita* (dependent on *tejas*), or *rakta-āśrita* (dependent on blood) and *jala-āśrita* (dependent on water element) according to Ḍalhaṇa. Its embryological development is from *blood* (*Su.Śā.*5.29). The water element and its representative *kapha* play the main part in the development of sclera; (ii) the central part of cornea (*kṛṣṇamaṇḍala*) also constitutes a part of *dṛṣṭimaṇḍala* . Hence the black and the white parts form the outer layer of the eye. It has been mentioned that four types of diseases of the black part obstruct vision (*Su.utt.*5.5) which also shows that it is a part of *dṛṣṭimaṇḍala* only.

Interstitial keratitis, changes in corneal curvature and increased or decreased antero-posterior length or sclera give rise to the same symptoms as those of the affliction of the first layer i.e., dimness of vision.

The second layer which is made of muscles (*māṃsāśrita*) lies next to the outer coat. It has a tendinous property (*kandaragma*) (*Indu* on *As.utt.*15.2). It has, therefore, a conjunctive property (*bandhanakara*). Contraction and relaxation are also the properties of the muscles, and the conjunctive function of ciliary body and iris is evident. There are three structures having these properties which are muscular in nature and are lying inside the cornea and sclera—the uveal tract i.e., iris, ciliary body and choroid. These three structures constitute the second layer of the eyeball. The complex of symptoms seen in the affliction of the second layer can be observed in the diseases of the uveal tract either due to posterior synechia causing lenticular changes or due to chronic uveitis. This leads to vitreous degeneration and consequently retinal detachment, thus giving rise to the symptoms noticed in the second layer affliction .

The third layer is made of adipose tissue (*medo-āśrita paṭala*) and lies inside the second layer. The semi-solid, whitish or pale appearance of the cortical matter of the lens is like *medodhātu* (fatty tissue). The symptoms described by Suśruta with reference to the third layer are very similar to the cataractous changes in the contractions of the cortical

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part of the lens as we know now. The visual status depends upon the site of the opacity of the lens.

The fourth or the last layer (*asthyāśrita paṭala*) is the innermost layer of the eyeball being made of bone (*asthi*) which gives support, shape and hard structure. The nucleus of the lens which supports the whole lens and the hard structure seem to constitute this layer. When this is afflicted, the condition of complete loss (*liṅganāśa*) of vision occurs. Nuclear cataract is the most distressing condition of the lenticular opacities especially when situated in the nodal point. This nuclear part is the last layer of the eyeball.

While treating corneal ulcer, Suśruta uses the word *tvag* for layer, while Vāgbhaṭa uses the word *tvaca* and *pāṭala*. In any case, the words *tvag* or *tvacā* or *paṭala* denote corneal layers. The latter is used to describe prognosis in the case of trauma in the eye (*netrābhighāta*) indicating possibly the severity of trauma inflicted on the eye. Among the diseases of the pupillary area called *pittavidagdhadṛṣṭi* and *kaphavidagdhadṛṣṭi,* (retinal disorders). The former refers to the affliction of the third layer when the patient is not able to see during daytime, while the latter affects all the three layers with the result the patient cannot see during night time.

Akṣibandhana **:** The vessels, tendons, adipose tissue and the like (*sirā, kandara, meda* and *kalakāsthi*) with their inherently acquired properties, keep the eye in normal condition. It has been stated that *kapha* in the vessels takes part in the conjunctive functions of the eyeball (*Su.utt.*11.9).

Vessels and channels (sirā and dhamani)

Suśruta has enumerated 38 vessels of the eye in relation to *vāta* (8), *pitta* (10), *kapha* (10), and *rakta* (10); (*Śa.*7.8). But, according to Vāgbhaṭa, there are 65 of them. Besides, there are two channels (*dhamanīs*) in each eye for the transmission of *rūpa* (visual impulse) to the mind, and two others to drain the tears (*Su, Śa.*9:5) as well as circular type of muscles and broad type of ligaments. (*Aṣṭ.hr.*Śa.3.17). They are two and thirty in number, respectively (*Su.Śa.*5.48), and a cartilage in the lids, according to Aruṇadatta, (*Aṣṭ.hr.Sū.*3.16). There is what is known as the *apāṅgamarma* (vital parts) situated above the eyebrows which are related to the eye. Any injury to these sites may result in the loss of eyesight or impairment of vision (*Su.Śa.*6.28; *Aṣṭ.hr.Śā.* 4.31).

Anatomy of the nose

The nose (*nāsā*) is the seat (*adhiṣṭhāna*) of the sense of smell in which the earth element is predominant. Nose forms two of the nine channels connecting the interior of the body with the exterior. The measurement of the nostril is stated to be one-third *aṅgula* and is composed of a cartilage and three bones (*Su. Śā.*5). Caraka, however, refers to only one joint bone, i.e., nasal, zygomatic and frontal bone (*Ca.Sū.*7.). There are two muscles and two vital parts (*marma*) in the nose and any trauma of the vital part results in the loss

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of smell (anosmia). The nose also forms a part of the cavernous and intra-cavernous sinuses. There are 24 vessels (*sirās*) in the nose out of which two are for the perception of smell. These are grouped into four channels carrying *vāta, pitta, kapha* and *rakta,*each six in number. Among them four vessels are said to be contraindicated in blood-letting. But their position, size, and other details are not given. Suśruta says that there are two channels (*dhamanīs*) for the perception of smell.

Anatomy of the ears

Karṇa, śravaṇa, śrotra or *śabdavaha* are synonyms of the word *karṇa* (ear) which is the site of the organ of hearing, and has the predominance of the element *ākāśa.* The gap between the ear and the temporal canthus (*apāṅgapradeśa*) is stated to be five *aṅgulas.* The word *pāli* is used for the ear lobule, but Ḍalhaṇa names it, *karṇalatika* (*Su.Śā.*9). There are ten *sirās* (vessels) in each ear and blood-letting (*sirāvedhana*) is contraindicated in vessels responsible for conduction of sound waves (*śabdavāhinī sirās*). There are also two channels (*dhamanīs*) responsible for sound conduction. Though the internal and middle ear have not been discussed in the texts, their disorders have been described to a considerable extent. Similarly, regarding *mukha śārīra,* (anatomy of the face, particularly the oral cavity) several scattered references are available in which almost all the parts of face have been dealt with.

NETRA-ROGAS OR OCULAR DISORDERS

The *Aṣṭāṅgahṛdaya* states that 'For the blind, day and night are the same; life and wealth have no use. Therefore one should be careful to preseve one's eyesight (*Ast. hr.utt.*13/98). As eyes are the gateway to the external world, any visual defect in them tantamounts to the obliteration of the world. This is the reason why eyes are considered most important among all the sense organs and hence eye diseases have been given priority in the *Śālākyatantra*. The Ayurvedic texts have described a number of ocular disorders—*Suśruta Saṃhitā* (76); *Caraka Saṃhitā*(4); *Aṣṭāṅgahṛdaya* (94); *Śāraṅgadhara* (94); *Bhāvaprakāśa* (78); and *Yogaratnākara* (76).

Causative Factors of Eye Diseases

Broadly, the causative factors of eye diseases, as described in the texts, fall under three categories: (i) dietary factors (*āharaja nidāna*) leading to the vitiation of the three *doṣas*; (ii) regimental factors (*vihāraja nidāna*) also affecting the three *doṣas*; and (iii) external ones (*āgantuja nidāna*) at first leading to disease and later to the vitiation of the *doṣas*. In general, the three types of causative factors are those that (i) cause direct or indirect trauma to the eye; (ii) lead to dimness of vision; and (iii) cause symptoms of discomfort, pain, discharge, etc. According to the *Hārīta saṃhitā,* the intake of hot, highly corrosive,acidic, saline and pungent substances, external injuries and looking at dazzling

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objects are the causative factors of eye diseases (*Ha. saṃ*.45.5). In the *Aṣṭāṅga saṅgraha*, general causes of eye diseases have not been described separately. The *Netraprakāśikā* by Pūjyapādamuni has listed the causes of eye diseases in detail which include excessive or deficient oil bath, working with shaky hands, witchcraft, drug-addiction, heavy weight-lifting, looking at dazzling objects like the sun, gems, gold and hot iron. The text (*paṭala*.1) also states that eye diseases are caused even by complicated dysentery and diabetes mellitus (*grahaṇī* and *meharoga*), besides by the suppression of yawning, tears, sneezing, hunger and burning sensation.

Pathogenesis of eye diseases

The pathogenesis (*samprāpti*) of eye diseases has been described in general along with some specificity in a few cases. When the vitiated *doṣas* start moving in a wrong direction through the channels, they reach the upper part of the body, particularly the region of the eye, and they give rise to various eye diseases (*Su.utt*.1). Vāgbhaṭa, on the other hand, states that food articles that are unwholesome for the eyes would cause eye diseases in which *pittadoṣa* is mainly involved. But Caraka thinks that when the waste products (*malas*) are lodged in the sense organs, pathology is produced leading to the functional impairment in the faculty of vision (*Su*.28.20).

Classification of eye diseases

The classification of diseases pertaining to the supraclavicular part of the body, i.e. *śālākyagata roga*, particularly those of the eye and oral cavity, is a unique feature of *Śālākyatantra* and it is an important contribution of Ayurveda as far as the method of classification of various eye diseases is concerned. The diseases are classified based on the following criteria: (i) involvement of a *doṣa;* (ii) topographical classification; (iii) prognosis; and (iv) treatment.

Prodromal symptoms (pūrvarūpa) of eye diseases : Before the complete manifestation of any eye disease, there are some prodromal symptoms which, in general, are: (i) dirty look; (ii) oedema (angry look); (iii) pricking pain; (iv) redness (congestion); (v) feeling of painful bristles in the fornices; and (iv) impairment of vision.

The classical Ayurvedic texts speak of a total of nine diseases which affect various junctional areas of the eye, commonly known as *sandhigatarogas.* There are details of the surgical management of most of these diseases along with the associated specfic procedures. However, the causative factors, prodromal symptoms and the pathogenesis of eye diseases have not been described separately, possibly because the general causative factors, prodromal symptoms, and pathogenesis of other diseases should be taken into consideration in the case of diseases of the junctional areas.

Puyalasa : Acute dacryocystitis is said to occur as a result of the vitiation of *tridoṣas* but it is a curable condition. Puncturing (*vedhana*), blood-letting (*raktamokṣaṇa*) and the

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application of a poultice (*upanāhasveda*) are the prescribed lines of treatment. But at present, incision, scraping (*lekhana*), and drainage are carried out with great care for the expulsion of accumulated pus or *doṣa*. It is interesting to note that Vāgbhaṭa has specified the site of the disease as *kanīnikā sandhi* (the inner canthus) which is also the site of pathology according to modern ophthalmology.

Netrasrāva : Ephiphora or chronic dacryocystitis is a condition which is characterized by continued discharge from the eye; the nature of discharge varies depending on the predominance of *doṣas*. In the *Śālākyatantra,* it is stated to be an incurable condition; yet, its treatment consisting of blood-letting, washing with the decoction of various drugs, application of a composition of three myrobalans as well as some internal medicines for checking the secretions has been described. Before the development of surgical treatment, in modern medicine also this condition was regarded as being incurable .

Another disease of the eyes called *parvaṇi* occurs as a result of the vitiation of *rakta doṣa*. In the *Suśruta saṃhitā*, the name of junctional area affected has not been specificed, while according to Vāgbhaṭa, it occurs near the fornices . For its treatment, excision is adopted with a rod shaped instrument having a hook (*badiśayantra*). If not treated in time, this disease leads to an advanced and incurable condition of phlyctenular conjunctivitis (*alaji*) whose site is the limbus which is also the place of phlyctenular conjunctivitis according to modern ophthalmologists. Another disease called *kṛmigranthi* or *blephritis* (in the *Yogaratnākara* it is named *janturagranthi*) affects the eyelid margin in which certain micro-organisms produce itching. If this condition is not treated in time, it can involve or affect the fornices as well as the deeper part of the eye ball and can also lead to sub-acute conjunctivitis along with other complications. The foregoing details reveal that the Ayurvedic practitioners who were also experts in ophthalmology, were aware of various complications of eye diseases that would arise, if they were not treated at the right time. The prescribed treatment for *blephritis* was that, after sudation, puncturing should be carefully done, followed by rubbing (*pratisāraṇa*) with the powders of three myrobalans, purified copper sulphate (*tuttha*) , iron sulphate (*kāsīsa*), and rock salt. It may be noted that this practice is followed even today.

Diseases affecting the eyelids (vartmagata roga): The two eyelids form the two layers and the circles which cover and protect the eyeball. Suśruta mentions (*utt*.3) as many as twenty-one diseases which would affect the eyelids, while Vāgbhaṭa describes a total of 24 diseases which comprise almost all the diseases affecting the eyelids. However, the pathogenesis of the eyelids has been discussed elaborately by Suśruta. The diseases called *utsaṅginī, bahalavartma,* and *kumbhika pīḍikā* as well as *lagana* resemble chalazion. According to Suśruta, the first one affects the lower lid only while according to Vāgbhaṭa, it involves both the eyelids. For the treatment of these diseases, careful scrapping is to be adopted and even today incision and scraping are the surgical methods recommended for the treatment of chalazion.

The features of *pothaki*, another eye disease described in the texts, resemble those of trachoma. An examination of the description of these diseases will reveal that *pothaki* is the main entity and the other three (*vartmaśarkara, arśovartma* and *śuṣkārśa*) are its

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advanced stages. In this eye disease, according to Ayurveda, only *kapha doṣa* is vitiated and if it is not treated properly and in time, all the three *doṣas* would affect the eyes, giving rise to the three advanced stages of infection as noted above.

According to the classical texts, all the four vitiated conditions as mentioned above, are curable and scraping is the main line of treatment. Before the advent of antibiotics in the western system of medicine, scrapping was the principal procedure adopted for the papillary form of trachoma. Till recently, the use of copper sulphate crystals to treat trachoma was in practice and is one of the main ingredients in the formulation of collyrium used for scraping.

The recommended treatment for the condition, called stye (*añjananāmika*), is sudation and incision. Even today, for curing a stye after suppuration, incision and drainage are adopted. In the early stages, before suppuration, fomentation is advised. Another disease *biśavartma* is generally comparable to *meibomitis* which is characterized by prominent pores of the meibomian glands. There is oedema of the lids, and at the lid margin multiple pores which become so prominent that from them watery secretion comes out.

Inflammatory swelling of the eyelids is another common condition. Nearly eight conditions relating to different inflammatory conditions of the lid have been described in the Ayurvedic texts, which reveal the depth of knowledge of this particular condition in ancient India. In addition, the texts have described two other conditions which affect the eyelashes, called *pakṣmasata* and *pakṣmakopa*. Falling of the eyelashes is the characteristic of the former which can occur as a complication of *blepharitis*. The latter (*paksmakopa*) is generally correlated with trichiasis which can occur because of either entropion, trachoma, *blephritis,* trauma, burns, operations or diphtheria. Both these conditions are stated to be controllable . Their treatments especially of *pakṣmakopa,* has been dealt with in detail. The line of treatment is: (i) surgical treatment (*śastra karma*); (ii) diathermy (*agni karma*); (iii) chemical cauterization (*kṣāra karma*); and (iv) medical treatment (*auṣadhi- cikitsā*). It is significant to note that the surgical procedure mentioned by Suśruta is similar to that followed even now.

The Ayurvedic procedure *(śastrakarma)* consists of the following: after oleation (*snehana*) of the body, its purification (*śodhana*) should be done by emesis and purgation . The area between the eyebrows and eyelashes should be divided into three parts and at the point joining the upper two and the lower one as well as at the middle of the nasal and temporal canthus, the skin equal in size to that of a barley grain should be excised, and the wound sutured by hair. One end of the stitch should be fixed by a bandage over the forehead, and the other end should also be held there by the same bandage. After this procedure, honey and clarified butter should be applied over the wound. After the wound heals, the sutures should be removed.

Modern procedure for trichiasis : This comprises epilation or the destruction of the hair follicle by diathermy or electrolysis. Treatment of spastic entropian is the surgical removal of a strip of skin and muscles. Under regional anaesthesia, an oval area of skin, with the long axis horizontal and varying in width according to the amount of entropion and of

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superfluous skin, is marked out just below the lid margin. The strip of skin is removed and the underlying fibres of the orbicularis, particularly the fibres of Riolan just at the lid margin, dissected out until the tarsus is exposed; four or five sutures should be inserted. (Ref.*Parson's Diseases of Eye*).

If surgical treatment is ineffective, diathermy (*agni karma*) should be conducted. If this procedure is also ineffective, the application of alkali (*kṣāra karma*) is to be employed. If the disease is still not cured, medicinal treatment should be given through the local application of the purified powders of *Hydnocorpus* laurifolia (*tuvaraka*) (after epilation of the affected eyelashes) and of *Terminalia chebula* (*hārītakī*). At present, the epilation of eyelashes is meticulously done in the early stage and, if it is not effective, electrolysis is carried out. In the Ayurvedic texts, there are details of other eye diseases like lagophthalmos (*vātahata vartma*), blepharo-spasm (*kṛcchronmīlana*), lid tumour (*vartmārbuda*) etc.

Diseases of the white portion of the eye : One of the common conditions affecting the white part of the eye (*śuklabhāga*) is known as pterygium (*arma*). On the basis of the physical appearance of this disease, five types have been recognized and discussed in Ayurvedic texts. If the physical appearance is more fleshy, it is *adhimāṃsa arma*; and if it is thick like tendon (fibrosed) it is called *snāyu arma*. A more vascular form of *arma* is called *lohita arma*. When pterygium is thin, *lekhañjana* (scraping) is recommended and when it is thick, *chedana* (excision) is recommended. In any case, surgery is forbidden in the case of xerosis or xerophthalmia (*śuktika*) which is stated to occur due to *pitta*. *Sirājāla* is compared to scleral haemangioma. For its treatment 'scraping collyrium' is recommended and, if the situation demands, excision also. *Sirāpīḍikā* (episclertis or scleritis) is recognized as being in a curable category. The modern diagnosis called pinguecula relates to *piṣṭaka* and *bālasagrathita* that appears due to the vitiated *kapha* and *vāyu*. For pinguecula, only medicinal recipes are recommended. Nowadays also no surgery is done for it.

Diseases affecting the black portion of the eye : The eye disease called *svarṇa śukla* or *kṣataśukla* is related to the corneal ulcer or ulcerative keratitis. Details about its curability and the need for its treatment have been described by Ayurvedic texts. Corneal ulcer is curable when (i) it is not near pupillary area (*dṛṣṭi*); (ii) it is not deep or not watering, and (iii) pain is less and there is only one ulcer. Corneal ulcer is stated to be incurable when (i) perforation occurs at the centre of the ulcer; (ii) the ulcer is covered with muscle tissue (iris prolapse); (iii) it moves from one place to another; (iv) it is surrounded by vessels; (vascular ulcer or serpiginous ulcer); (v) it obstructs vision; (vi) it affects two layers or *pāṭala*; (vii) it is vascular at the periphery; (viii) it is of long duration; (ix) epiphora or watering is constant; and (x) it looks like a grain (*keratocele*) of greengram.

Vāgbhaṭa has used the words *tvaca* and *pāṭala* during the description of prognosis of corneal ulcer. (*Ast.hr*.Ut.10). When the ulcer pierces the corneal layer (*tvacā*) it looks like a ripe *jambu* fruit and it is difficult to cure . When it reaches the second layer (*paṭala*), it is also difficult to cure and if it reaches the third layer it is incurable.

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Suśruta has given some *añjana* (collyrium) preparations for its treatment, while Vāgbhaṭa has prescribed blood-letting also in addition to local treatment. Vāgbhaṭa uses *pāṭala* for the corneal layer while describing the corneal ulcer in detail. He has prescribed blood-letting also. (*Ast.hr.Utt.*11)

Āvraṇa śukla is another common disease affecting the cornea and correlated with corneal opacity. When it occurs, white spots appear on the cornea but without much pain and lacrimation. The same features appear in corneal opacity. Surprisingly, this is said to be curable; if it is deep or enduring it is curable with difficulty. Perhaps a clinical trial may be carried out using preparations of collyrium to find out whether this disease, which is otherwise incurable, can be cured.

When affected by *abhiṣyanda,* the whole cornea turns whitish with severe pain in the eye, a condition called *akṣipākātyaya* or *pākātyaya* which is related to serpiginous ulcer or panophthalmitis, and is difficult to cure or incurable. *Ajakajāta,* similar to iris prolapse or anterior staphyloma, results in reddish shiny secretion as a mass bulges out piercing the cornea. Surgical treatment for *ajaka* is suggested where a needle is used to puncture it and allow the fluid to flow out. The wound is covered by dried cow-flesh mixed with clarified butter. If the protrusion is large it should be scraped (similar to iridectomy). In addition to this procedure, blood-lettting is also useful (*Yogaratnākara*; 2.6).

Diseases affecting the complete eye (sarvagata roga)

There are 17 disorders described in the *Suśruta saṃhitā,* which affect the complete eyeball. Among these, *abhiṣyanda* is said to be the root cause of all eye diseases, apart from others (*Su.*utt.6). Signs and symptoms of *abhiṣyanda* resemble the commonest ocular ailment, i.e. conjunctivitis. In *vātaja abhiṣyanda*; the symptoms are: pricking type of pain , horripilation, cold watery discharge, and foreign body sensation similar to acute catarrhal conjunctivitis. *Paittika abhiṣyanda* is characterized by burning sensation, suppuration, and hot watery discharge. In *kaphaja abhiṣyanda* there will be acute mucopurulent conjunctivitis characterized by oedema in the eyes, itching, cold and white discharge. It is also characterized by the appearance of white spots on the cornea which are not associated with much pain and lacrimation.

Treatment of conjunctivitis may be local or general, and is of two types (i) acute stage (*āmāvasthā*) and chronic stage (*pakvāvasthā*). The general remedies are: oleation (*sneha*), fomentation (*sveda*), purgation (*virecana*), medicated enema (*basti*) and blood-letting. The local measures are, (*āścyotana*) eyedrops, (*seka*) irrigation, (*vidālaka*) application of drug paste avoiding eyelashes, eyebath (*tarpaṇa* and *puṭapāka*), fumigation (*dhūma*) and nasal medication (*nasya*).

Adhimantha (glaucoma), characterized by severe eye pain, is considered as an advanced stage of *abhiṣyanda* (Su.utt.6). When *vāta doṣa* is involved, pain (like churning) foreign body sensation, pricking and cutting sense (hemicrania). When *pitta* is predominant, the eyes are congested and a burning sensation in the eyes and head ensues. When *kapha* is high, coldness, heaviness, itching, sliminess, muddy discharge from the eye and horripilation and headache are the symptoms. Due to the intensity of

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rakta, more congestion, tense eyes, sanguinous discharge, and prickly pain are the symptoms.

Modern authors relate *adhimantha* to glaucoma. In the Ayurvedic texts, glaucoma is represented as (i) acute congestive glaucoma—*vātika adhimantha*; (ii) another aspect of acute congestive glaucoma-*pittaja adhimantha*; (iii) chronic simple glaucoma and chronic congestive glaucoma *kaphaja adhimantha*; and (iv) congestive glaucoma or secondary glaucoma—*raktaja adhimantha*.

According to modern medicine, conjunctivitis leads to secondary glaucoma. Since the symptoms of different types of *adhimantha* are close to various types of glaucoma, one can conclude that *abhiṣyanda* or conjunctivitis could be an important causative factor besides being a general causative agent for eye disorders. If treated in time, it can be cured and if not, it leads to blindness after a specific time according to Vāgbhaṭa and Suśruta (*Ast.hr.Utt.*15); (*Su.utt.*6). Such a situation is seen happening in modern times too.

When *vātika adhimantha* is neglected it may result in *hatādhimantha* in which the patient gets severe pain in the eye and the eyeball atrophies due to vitiated *vāta*. *Hatādhimantha* is related to what is known now as phthisis bulbi or atrophic bulbi which is secondary to acute congestive glaucoma.

Two types of *hatādhimantha* have been mentioned in the text as the opinion of Ācārya Videha: (i) the condition in which vitiated *vāta* results in the atrophy of the eyeball; and (ii) the vitiated *vāta* gets lodged in the channels of the eye and results in the protrusion of the eyeball with severe pain.

Saśopha akṣipaka is another disease affecting the whole eye (*sarvagataroga*) which occurs when the three *doṣas* act together. It is characterized by severe itching, burning sensation, foreign body sensation, horripilation, lid oedema, pricking and coppery red eyes. This condition is related to cellulitis of eye-ball or uveitis or, as some modern ophthalmologists consider it, panophthalmitis. These are difficult to cure till date while *saśopha akṣipāka* is considered as a curable entity. Various curative recipes found in the Ayurvedic texts for its treatment should be tried experimentally as well as clinically.

Aśopha akṣipāka or uveitis or endophthalmitis has the same features except oedema, and is curable. Blood-letting and some recipes for local application have been described in the text. *Śuṣka-akṣipaka*, another condition which brings about inflammatory changes, is due to *vāta*. It is related to xerophthalmia or a complicated stage of trachoma. Being curable, the use of clarified butter (ghee) and nasal medicine (*nasya*), irrigation (*seka*), collyrium and eye bath (*añjana and tarpaṇa*) are beneficial. Vāgbhaṭa has prescribed local use of a recipe called '*sandhāva*', for the removal of pain. Copper scraps kept immersed in cow's urine in an iron container may be taken and used locally with ghee. Conchshell rubbed with breast milk in a copper container may also be used with the leaf of *śami* (*Prosopis specigera*) anointed with ghee for fumigation. The other eye diseases—*amladhyauṣita*, *śirotpāta* and *śirāharṣa* are related to allergic manifestation. The first is due to *pitta*, and such remedies as would remove *pitta*, and blood-letting may be adopted for curing this; collyrium (*añjana*) preparations are also recommended. There are other disorders which mainly cause pain in the eye due to the vitiation of *vāta*.

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Diseases related to pupillary area (dṛṣṭigata rogas): As stated earlier, the *timira* disease affects various coats of the eyeball. (Su.ut.1) *timira, kāca, liṅganāśa* are different stages of progressive pathology. When causative factors for *timira* affect the fourth layer (*pāṭala*) vision gets obstructed all around and the disease *linganāśa* ensues (*Su.utt*.7/15). In less advanced stages the patient can see bright objects Liṅganāśa is also called *nīlikā* or *kāca*.Suśruta says that *timira* affects first three layers and leads to *linganāśa*. Vāgbhaṭa introduces an intermediate stage called *kaca*. According to him *timira* affects the first and second layers, *kāca* the third, and the final stage of *linganāśa* results by the affection of the fourth layer (*Aṣṭ.hṛ. Utt*.12.1-7). Among the 94 types of ocular disorders, six types are described by Vāgbhaṭa, *liṅganāśa* is not treated separately but is included under prognosis of *timira*.

The symptoms of *liṅganāśa* resemble cataract which causes blindness. *Kaphaja liṅganāśa* has features of a mature cataract which has to be operated. (*Ast. San.Utt*.16.2, *Aṣṭ.hṛ.Utt*.12.13; *Su.Utt*.17.2) Other types of *liṅganāśas*, however, have not been described. Treatment of *timira* before reaching the stage of *liṅganāśa* depends on the layer involved and dominance of *doṣas*. Before the treatment starts, the body should be cleaned by fasting and purgation (*laṅghaṇa and virecana*)

Local measures: Local measures of treatment include eye bath (*tarpaṇa*) irrigation (*ṣeka*), eyedrops (*aścyotana*), collyrium (*añjana*), and nasal medication (*nasya*) (*Su.Utt*.12/4). In its management, the emphasis is on collyrium for diseases of pupillary arts as *añjana* removes the localised defects of the eye (*Su.utt*.5.2), Recipes for nasal medication have also been given.

Systemic measures: The systematic treatment of *timira* (blindness) begins with blood-letting to purify the blood (*raktamokṣana* to relieve *raktaduṣṭi*) (*Su.Utt*.7.21). For the correction of abnormal movement of *doṣas,* old clarified butter, or better, castor oil for *vātajatimira* is recommended, and in the case of *pittajatimira* and *kaphajatimira*, *triphalāghṛta* and *trivṛttaghṛta* respectively are recommended with dietary restrictions (*pathya* and *apathya*) advised for *timira*. A thorough review of surgical treatment *kaphaja liṅganāśa* reveals that the Ayurvedic sages knew the importance of pre-operative and post-operative measures as well as the complications involved in their management. The procedure is similar to extra-capsular extraction of the lens including perhaps couching.

When *pitta doṣa* gets lodged in the third layer and if the patient can see only during night time, it is known as 'day blindness' (*pittavidagdha dṛṣṭi)*. Dimness of vision during daytime happens to a patient having central cataract also. Retinitis pigmentosa (night blindness) occurs when *śleṣmavidagadhadṛṣṭi* appears, a condition in which the *kapha doṣa* gets localised in the third layer and the person is not able to see in the night hours. Measures to remove *pitta* and *kapha* are advised here for both these conditions. Blood letting or surgical treatment is forbidden in such cases. Several collyrium preparations are also prescribed for *pittavidagdha dṛṣṭi* and *kaphavidagdha dṛṣṭi*. The symptoms of night blindness are found in three conditions: (i) *śleṣmavidagadha dṛṣṭi*; (ii) *hrāsavajādya*; and (iii) *nakulāndhya*. Among them *hrāsavajāḍya* and *nakulāndhya* are incurable and they are compared to (i) retinitis pigmentosa and (ii) degenerative choroiditis, respectively.

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Gaṃbhīrikā which is related to phthisis bulbi or endophthalmitis, is another incurable eye disese due to *vātadoṣa*.

Sanimitta liṅganāśa (with a specific cause) and *animitta liṅganāśa* (non-specific) are two diseases caused externally [called *āgantuja liṅganāśa*] which have been mentioned in the texts in addition to 76 diseases. *Nimittaja liṅganāśa* is preceded by headache and exhibits all the features of *abhiṣyanda*. In *animitta liṅganāśa*, the light is lost while visualizing luminous bodies and the eyes appear like rubies. Another ailment called *nayana abhighāta* is trauma in the eye layers leading to loss of vision. *Kukunaka* is yet another disease which affects children only and which occurs due to the vitiation of breast milk, *kapha, vāta, pitta* and *rakta* affecting the eyelids. The features are the same as those of ophthalmia neonatorum, and emesis is an important treatment for this. The other treatments are washing, irrigation, application of eyedrops, and certain collyria combinations.

NĀSAROGA OR NASAL DISORDERS

Pratiśyāya is an important disease of the nose leading to many nasal disorders. It has been emphasized that pathogenesis and prodromal symptoms are common symptoms of all nasal disorders. Four types of *pratiśyāya* have been listed in the texts as follows:

(i) *Vātika pratiśyāya*: The symptoms are cold, watery discharge and bleeding from the nose, dryness of throat, palate and lips, and sneezing, which are similar to rhinitis;
(ii) *Pittaja pratiśyāya*: The patient gets warm and yellowish discharge related to acute rhinitis or acute influenza
(iii) *Kaphaja pratiśyāya*: This is hypertrophic or chronic rhinitis when the patient has repeated whitish cold discharge of *kapha* through the nose;
(iv) *Raktaja pratiśyāya*: bleeding from the nose occurs and a foetid smell comes from the breath with loss of smell (*anosmia*); whitish small worms come out of the nose as in *kṛmija śiroroga* and it resembles acute influenza.

Apināsa is like acute rhinitis having similar symptoms; and *pakva apināsa* is like chronic rhinitis.

When all the three *doṣas* vitiate together, the symptoms of *partiṣyāya* appear and disappear all of a sudden with or without suppuration like allergic or vasomotor rhinorrhoea.

These *pratiśyāyas* lead to *duṣṭa pratiśyāya* or chronic rhinitis or hypertrophic rhinitis resulting even in deafness, blindness and anosmia. Some eye disorders, chronic cough, dyspepsia, infections, falling of hair, greying of hair and nasal disorders also occur.

Detailed surgical treatment for nasal disorders have not been given in the texts. The medical treatments of nasal disorders may be local or general . For *nava pratiśyāya* or acute rhinitis, fasting is important; hot food, sudation, and digestive drugs, with milk or jaggery are advised. For *jīrṇapratiśyāya,* internal use of clarified butter, sudation, emesis, purificatory nasal medication (*avapīḍa nāsya* and *śirovirecana nāsya*), purgation, enemata

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with decoctions (*āsthāpana basti*), (*dhūmapāna*) smoke inhalation, *kavala* or gargling are the treatments. Several other medicines such as *nāradīya lakṣmīvilāsa rasa, mṛtyuñjaya rasa* etc. are advised.

Bad smell (Putīnasa): A bad smell from the nose and mouth comes from vitiated *pitta, kapha* and *rakta* in *puṭīnāsa* which is related to atrophic rhinitis or ozaena. *Puṭīnāsa* resembles frontal sinusitis. The treatment for *puṭīnasa* includes oleation, sudation, emesis, purgation and *avapīḍa nāsya* for local application. Nasal frunculosis or dermatitis of the vestibule (*nāsapāka*) is characterized by multiple boils with marked suppuration. It is associated with shiny discharge and sloughing of tissues. A drug prepared by the bark of a plant called *kṣīrivṛkṣa* or milk-exuding plants and clarified butter can be used for irrigation and external application (*pariṣeka* and *lepa*) after blood-letting.

Nāsagataraktapitta is bleeding in the nostrils which can be treated as in the case of *pittadoṣa*. It is of four types.

Pūyarakta is similar to frontal sinusitis or hypertrophic or chronic rhinitis. For treatment, emesis, *avapīḍa nasya sirovirecana* and *tīkṣṇadhūmapāna* are said to be helpful.

Sneezing (*kṣavathu*) is a disease in Ayurveda but it is usually regarded only a symptom. When the vitiated vāyu gets lodged in the cavernous and inter-cavernous sinuses (*śṛṅgāṭakamarma*) of *nāsa* and make a sudden exit through the nose with copious discharge of *kapha,* this condition is called *kṣavathu,* which is nothing but the sneezing reflex.

Many opine that *bhrambhuśathu* is an advanced stage of *kṣavathu*. The treatment for this consists in giving purgative errhines with powdered medicine (*dhūmapāna nāsya*), sudation with drugs to pacify *vāta, śirobasti* etc.

When a severe burning sensation is felt in the nose, the condition is known as *dīpta*. *Nāsapratināha* or *nasanāha* is blocking of the nose which is considered as a separate disease in Ayurveda comparable to deviated nasal septum (DNS). The ailment, *nāsanāha* occurs when *udānavāyu* is encircled by *kaphadoṣa* and gets lodged in its own channels. Nasal blockage occurs due to chronic rhinitis, hypertrophic rhinitis, nasal polyp, etc.

Nāsaparisrāva is colourless, clear, watery discharge from the nose, which increases during the night hours, according to the texts like *Bhāvaprakāśa, Yoga-ratnākara, Gadanigraha, Mādhvanidāna* and *Ayurvedavijñāna*. It is characterized by yellowish or whitish dischrage from the nose. Suśruta's description of this affliction relates to allergic rhinitis, whereas the descriptions in the other Ayurvedic texts relate to hypertrophic or chronic rhinitis. The remedy for this disease is the internal use of clarified butter, smoke therapy (*dhūmapāna*), application of oil on the head (*sirovasti*), and oil massage specially by *balātaila*.

Nāsadoṣa is a condition that arises when the nasal passage dries up due to *vāyu* and heated by *pitta* leading to difficulty in breathing. It is comparable to atrophic rhinitis or rhinitis sicca. Internal use of clarified butter or milk or clarified butter with flesh of animals of acrid regions, nasal medication, or inhaling smoke of any substance (*snigdhadhūma* or *nasya* with *anutaila*) are effective remedies.

Nāsarśa or nasal polyp is a fleshy growth in the nose which is of four types depending on the doṣas. Nasal growths (*nāsārbuda*) have been recognised as of seven types based on *doṣas* but further details have not been given.

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Prognosis of nasal disorders

Prognosis (*sādhyāsādhyatā*) of nasal disorders are not given clearly in the *Suśruta saṃhitā*. Vāgbhaṭa mentions 18 nasal disroders; while *duṣṭa pratiṣyāya* is controllable (*yāpya*) the others are curable (*sādhya*).

DISEASES OF THE EAR

Otalgia or earache (*karṇaśūla*) is treated as an independent disease of the ear in Ayurveda. When vitiated *vāyu* encircled with other *doṣas* begins to move in abnormal directions in the ear, earache ensues according to Suśruta. This causes severe pain and it is difficult to cure. Depending on its nature, Vāgbhaṭa has identified five types of earache which is comparable to what we know as *otitis media*. If it is of *vāta,* there will be watery discharge, in the case of *pitta* it may be watery or yellowish, and in the case of *kapha,* thick whitish discharge occurs from the ear.

In this context, the five types of *karṇaśūla* have been mentioned : (i) acute serous otitis media or otitis externa (*vātika karṇaśūla*); (ii) acute otitis externa or acute serous otitis media (*pittaja karṇaśūla*); (iii) chronic otitis media (*kaphaja karṇaśūla*); (iv) acute otitis media due to trauma (*raktaja karṇaśūla*); and (v) acute or chronic suppurative otitis media (*sannipātaja karṇaśūla*).Otorrhoea or otitis externa or chronic suppurative otitis media corresponds to *karṇa-srāva* described by Suśruta. As a result of trauma or overhead immersion in water or due to suppuration of an abscess, *vāyu* gets vitiated and the discharge in the ear ensues. Such a discharge occurs also due to what Suśruta calls the *karṇapāka, puṭīkarṇa, kṛīmikarṇa.* General treatment recommended by Suśruta for all ear disorders includes internal use of clarified and restorative drugs, avoiding a headbath and physical exertion, maintenance of celibacy and rest to the vocal cord. To check the discharge, nasal medication, fumigation, filling in the ear, (*pūraṇa*), cleaning (*pramarjāna*) and washing (*dhāvana*) for otalgia (*karṇaśūla*), and otorrhoea (*karṇasrāva*) are suggested and the patient is given oleation therapy and then purgation by oily drugs, as well as *nāḍīsveda* and *piṇḍasveda* or sudation with silk (*kṣauma*), comnifera mukul (*guggulu*), Acquilaria agallocha (*aguru*) and clarified butter (*ghṛta*) are recommended. Oleation with *dīpikataila, kakolyādi ghṛta, arkataila, kapitthādi taila, bilvādi taila, vacalaśunādi taila* are recommended for filling the ear. It has been recognized that otalgia leads to complications such as unconsciousness (*mūrchā*), burning sensation, fever, cough, drowsiness, and even death may occur if not cured early.

Tinnitus is another common complaint associated with many ear disorders and it is a condition that causes much discomfort to the patient and interferes with his day-to-day work. *Karṇanāda* or *karṇakṣveda* are two conditions which resemble tinnitus. *Karṇanāda* causes different sounds in the ear while *karṇakṣveda* is a whistling in the ear. According to Suśruta it is due to *vāta doṣa* but Videha includes *kapha* and *rakta* vitiation. The treatment for this problem is the same as that for *karṇaśūla* or *karṇasrāva.*

When vitiated *vāyu* alone *or along* with *kapha* gets lodged in the sound-conducting channels (*śabdavāhasirās*) and, if it is not mitigated or pacified in time, it leads to

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deafness (*bādhirya*), according to Vāgbhaṭa. Although the ancient writers thought of *śabdānuvahā* or the transmission of sound waves that occur in the brain centres, they did not know the related anatomical details. Treatment of deafness consisted of blood letting and emesis. Administration of oils like *bilvādi taila, induvati* and purified *balā taila* is said to be very effective in this condition. It has been pointed out that *karṇagutha* (cerumen) collects in the ear when *kapha* dries up due to the heat of *pittadoṣa*. For its treatment, softening of the waxy collection by sudation and putting oil drops into the ear and its careful removal with a thin rod-like contrivance are recommended in Ayurveda, and the same method is adopted in modern times.

Karṇapratināha is related to the perforation of tympanic membrane, or the obstruction of the Eustachian tube. Another disorder, *karṇavidradhi,* corresponds to serous otitis media and is caused by exogenous ailments like trauma, and endogeneous factors due to accumulated *doṣās*. The disease is characterized by blood stained yellow or reddish discharge, pricking or burning sensation, smoky feeling, and severe pain. Among the treatments for curing this disease is the use of mustard oil for filling the ear and it is found to be effective.

Karṇaśopha and *karṇa arśa* (inflammation and polyp in the ear respectively) and the occurrence of a tumour (*karṇa arbuda*) are the other diseases of the ear. The symptoms are similar to inflammation or polyp in any part of the body. Foul smelling discharge and deafness are the main features of these ailments.

Diseases of karṇapāli or ear lobule

According to Ayurveda, *paripota, utpāta, unmantha, dukhavardhana* and *parilehi* are the five diseases affecting the ear lobule. Vāgbhaṭa has stated that *kūcikarṇaka, tāntrika* and *karṇapippalī* are some additional congenital anomalies. *Kucikarṇaka* is a stage where during pregnancy the external ear gets shrunken due to the vitiation of *vāta*. *Karṇapippalī* is an accessory auricle or auricular tubercle that comes up due to a fleshy growth before birth. As a result of the vitiation of the three *doṣas,* the pinna swells with pain either during pregnancy or after birth. If it is not treated early, it may lead to fibrosis resulting in the constriction of the ear lobule. Sometimes dermatatis or eczema of the external ear occurs and this condition is called *karṇavidārika*. During ante-natal period or post-natal period, another disorder called *pāliśoṣa* occurs due to the atrophy of ear lobule when vitiated *vāyu* gets lodged in the vessels of the ear. *Tāntrika* is another condition when vitiated *vāyu* gets into the thin or hard ear lobule, but can be controlled, according to Vāgbhaṭa who also opines that the other diseases like *karṇapippalī, sannipāta śūla, vidāri* and *kūrcikarṇika* are incurable.

Śiroroga

The term used in Ayurvedic texts indicates a group of diseases of the head in which pain is a cardinal symptom. *Śirovidradhi, śirogranthi* and *śiroarbuda,* are general disorders. *Aruṇsika, dāruṇaka, khālitya* or baldness, *pālitya* or premature greying, are listed under

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minor disorders (*kṣudra rogas*) by Ayurvedic writers except Vāgbhaṭa and Śārṅgandhara who consider them as diseases of the scalp (*kapālagata rogas*).

The diseases of the head occur due to the vitiations of all the three *doṣas* and eleven types are listed under head disorders. In *vātikaśiroroga* pain starts without a cause and increases in the night. It gets relieved by wrapping a cloth over the head, fomentation and oil massage. Due to *pitta* the headache brings about a severe burning sensation and is related to acute sinusitis or bilious headache. The headache of *kapha* origin is similar to rhinitis or sinusitis, and that due to vitiated *rakta* along with *pitta,* causes hyperaesthesia in the patient. This happens due to high blood pressure or acute alchoholism. It has been explained that when the three *doṣas* occur together all the symptoms of the *doṣas* appear. *Kṣayajaśiroroga* occurs due to *kṣaya,* waste or depletion of *dhātus* or elements such as *vāta, kapha* and *rakta* because of trauma etc. In this condition the patient gets intense pain in the head which is difficult to cure, and it gets aggravated by fomentation, emesis, fumigation, nasal medication, and blood-letting which are the general treatments given to patients.

The Ayurvedic classics have delineated the other types of headache, their symptoms and the importance of curative methods in their early stages. For the diseases of the head, nasal medication (*nasya*) is the first treatment as the nose is the gateway to the head (*Sa*.Si.9) Irrigation,applying paste on the eyelids (avoiding eyelashes), fumigation, purgation and certain types of oil enema are suggested. Cakradatta says that the application of oil on the head is effective for head disorders due to *vāta*. Many decoctions of herbal medicines (*kaṣāya* preparations) are also recommended.

DISEASES OF THE ORAL CAVITY (MUKHAROGAS)

Diseases of the oral cavity are classified into seven groups and the categorization is generally done topographically. Although Caraka gives a list of 64 diseases, he describes only four of them based on the predominance of *doṣas*. Vāgbhaṭa has added one more: the affliction of the zygomatic region (*gaṇḍapradeśa*).

DISEASES OF LIPS (OṢṬHAGATA ROGAS) (*Su.Ni*.16)

Due to lip disease of *vāta* origin (*vātika oṣṭhakopa*) cracks in the lips appear which may become dry, rough, callous to touch, black, and develop prickly pain comparable to angular stomatitis. Vāgbhaṭa adds another condition called 'cleft lip' (*khaṇḍoṣṭha*). The treatment consists, as in the modern approach, in freshening the edges of the torn parts, suturing them with silk thread (*kṣaumasūtra*), and treating it later as a fresh wound.

Lip disease of *pitta* orgin which, in modern parlance is aphthous ulcer, results in boils like mustard seed and causes burning sensation, perforation and discharge, turning the colour of the lip yellow or blue. In the case of *kapha-ja* lip disease, i.e., herpes labialis, multiple but painless skin-coloured eruptions occur causing itching and the lips become cold, heavy and slimy . In what is known as *sannipātaja oṣṭhakopa*, the lips sometimes become black or whitish, and rashes of various kinds appear all over the lips. Vāgbhaṭa

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says that there will be sudden appearance and disappearance of oedema over the lips and there will be pain, foul smell, and shiny discharge on the lips; in some places suppuration would also occur. Suśruta's description relates to aphthous ulcer, and Vāgbhaṭa's to lip carcinoma. Lip granuloma (*raktaduṣṭa oṣṭhakopa*) is a condition when rashes looking like ripen dates occur on the lips and bleeding occurs due to vitiated blood (*raktaduṣṭa oṣṭhakopa*) which corresponds to lip granuloma. In *māṃsaduṣṭa oṣṭhakopa* i.e., epithelioma or granuloma or maggots ulcer, the lips become heavy, thick, as well as elevated and worms also appear on the corners of the lips.

When, due to adipose tissue (vitiated *medas*), itching and discharge occur in the lips, it is called macrocheilia or herpes labialis (*medaduṣta oṣṭhakopa*).

Another disease called *kṣataja* or *abhighātaja oṣṭhakopa* relates to harelip due to trauma when cuts on the lips occur, which become hard with an itching sensation. Hardening of the lips indicates fibrosis secondary to trauma . *Jalārbuda*, yet another ailment, is related to a cyst on the lips; the ailment, *Gaṇḍalaji,* takes place in the zygomatic area, resembling cellulitis of cheek, swelling occuring in the zygomatic area, with burning sensation and fever. The Ayurvedic texts have prescribed curative procedures for the treatment of these disorders, generally local treatment (*sthānika cikitsā*).

DENTAL DISEASES

Dental diseases are of two kinds: (i) diseases of teeth at the root and gum (*dantamūlagatarogas*); and (ii) diseases of the teeth (*dantagatarogas*). In respect of the former three of these conditions—*śītāda, dantapuppuṭa* and *dantavaidarbha*—are characterized by bleeding in the gums as the common symptom which is a cardinal feature of scurvy. In *śītāda* due to vitiated *kapha* and *vāta,* sudden bleeding occurs in the gums which, as a result, become soft, blackish, and a foul smell emanates from them. A condition of scurvy happens when the root of the gums rot and fall off. If a painful swelling condition is seen among two or three teeth-roots, it is called *dantapuppuṭa*. This happens due to vitiated *kapha* and *rakta*. These features are seen in localized gingivitis or gumboil or alveolar apical abscess. *Dantavaidharba* (allergic gums) are inflamed and the teeth become loose due to trauma over gums. *Dantaveṣṭaka* and *upakuśa* are two conditions in which the gum and teeth roots are affected; it is called *dantaveṣṭaka*; *upakuśa dantaveṣṭaka* is pyorrhoea alveolaris when the teeth become loose and blood as well as pus are discharged. In *upakuśa*, a stage of pyorrhoea alveolaris, due to vitiated *pitta* and *rakta,* burning sensation and suppuration occur in the gums. In this condition, the teeth become loose, the gums get inflamed, painful and bleed. When *vāyu* is vitiated, a new tooth called *vardhana* is said to erupt. *Adhimāṃsa* relates to an impacted wisdom tooth when, due to vitiated *kapha*, painful swelling at the root of the third molar with shiny discharge occurs, and pain increases while eating.

Sauśira symptoms resemble those of an apical abscess or chronic gingivitis. The two types, *mahāsauśira* and *paridara*, correspond to cancrum oris or gangrenous stomatitis. In *mahā sauśira* all the three doṣās are vitiated. Teeth become loose; and gum, palate and lips get rotten. Severe pain in the whole of the oral cavity also occurs when *pitta, rakta,*

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and *kapha* are vitiated. As the teeth start rotting and blood discharges along with sputum the condition is called *paridara.* Five kinds of *dantnāḍī* or sinuses of the gums have been described depending on the *doṣa* involved. When the gums are not treated even after suppuration, the accumulated pus causes decay of flesh, of gums, bones, etc. giving rise to sinus. Vāgbhaṭa includes *dantavidradhi* (or alveolar abscess or gum boil), which as a result of vitiation of three *doṣās,* along with *rakta*, causes intense inflammation of gums with severe pain and burning sensation. After suppuration there will be blood-stained pus discharge from the teeth. For the treatment of the diseases of the teeth and gums, rinsing the mouth with drug decoctions, errhines, rubbing, excision, and blood-letting, are recommendd. In *śītāda*, blood letting, rinsing the mouth with decoctions of purificatory (*śodhana, gaṇḍūṣa*) and nasal medications should be done, according to the *doṣa* involved. For instance, rinsing the mouth with *śunṭhi, sarṣapa, triphalā, musta*, *Brassica juncea*, and *Cyperus rotundus*) is advised. For *dantapuppuṭa*, after blood letting, rubbing with five types of salts, (*pañcalavaṇa*) and the administration of barley ash (*kṣāra*) and honey are recommended. Vāgbhaṭa prescribes sudation, excision, puncturing followed by rubbing with *madhuyaṣṭi, sarjikṣāra* (soda bicarbonate), *śunṭhi* (ginger)and rock salt (*saindhava*). The Ayurvedic texts have effective curative techniqueṣ for several other dental disorders.

For *dantavaidarbha* the injured part may be cleaned by a circular knife (*maṇḍalāgra śastra*) and the application of alkali, rinsing the mouth, and nasal medication with drugs of cold potency are suggested. For *dantaveṣṭaka*, after blood-letting, rubbing with *lodhra* (*Symlocose racemosa*), *madhuyaṣṭi, lākṣā*(lac), *rakta candana* (red sandal) with honey would be beneficial. Rinsing with the decoction of milk- yielding plants (*kṣīrivṛkṣas*) mixed with honey, sugar, ghee is effective. Errhines with ghee processed with extracts from the plant called *kakolayādi gana* and milk are also beneficial. For *upanāha* and *paridara,* the treatment is similar to *śītada*. After emesis, purgation, and blood-letting should be made with the leaves of *kākodumbara* (*Ficus hispida*), *gojihvā* (*Onosma bracteatum*). Nasal medication, gargling with drugs of plant called *kakolayādi gana* is helpful. In the case of *vardhana*, the extra teeth can be removed by diathermy. For *adhimāṃsa,* excision is the remedy followed by application of a powder of *vacā* (*Acorus calamus*), *carva* (*Piper retrofactrum*), *patha* (*Cisampalose pariera*), *sarjikṣara*, barley ash, and gargling with pippali extract and honey, is beneficial. Purificatory nasal medication and smoke therapy are helpful in relieving pain. In the case of *sāuṣira* and *mahā sauśira*, after blood-letting, *lepa* (ointment) from the extract of *rasāñjana* (*Berberis aristata*), *lodhra,, musta* with honey should be applied prepared. Rinsing the mouth with milk-yielding plant powder is also helpful. Errhine should be given with oil and ghee processed with drugs that would remove *pitta*. If a sinus is formed at the root of a tooth, that tooth may be extracted followed by the excision of gums in and around that area. However, this treatment is forbidden if the tooth has a sinus in the upper jaw as it leads to bleeding, facial paralysis (*ardita*), and even blindness. In such cases, rinsing the mouth with the decoction of *jāti* (*Jasminum grandiflorum*), *madanaphala* (fruits of *Randia dunetorum*), *gokṣura* (*Tribulus terrestris*), *khadira* (*Acacia catechu*) and *kaṭuki* (*Piccorrhiza kurroea*) should be done. If this fails, diathermy or cauterization can be resorted to. If sinus of the gums is not treated in time, it results in osteomyelitis of the jaw (*asthivraṇa*) mandible or maxilla (*hanukāsthi*).

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In *dantavidradhi*, before pus formation, gargling with pungent (*tīkṣṇa*), hot (*uṣṇa*), dry food articles (*rūkṣadravyas*), and rubbing with the powders of *kaṭuki, kuṭa* (*Sussurea lappa*), *punarnava* (Boerhaavia diffusa) should be done. To prevent suppuration, drugs of cold potency should be used after suppuration and also incision is advised. If it is deep-rooted, cauterisation should be done.

Dantagatarogas: Among the diseases due to '*dālana*' the patient feels the bursting of teeth. Because of *vāyudoṣa*, there will be more sensation to cold food. Severe toothache also occurs due to attrition in old age or carious teeth. Due to *dantaharṣa* the patient cannot bear the sensation of cold or hot because of vitiated *vāyu* and *pitta,* and even becomes unable to eat sour food. This symptom is seen in odontitis due to the exposed nerve filament, caries or attrition of the teeth.

The deposition of tartar (*dantaśarkarā*) is an independent disease in Ayurveda. Due to the improper cleaning of teeth, *mala* (*kapha*) of the teeth dries up because of *vāyu* and becomes hard, giving a bad smell. Another condition when enamel separation occurs is called *kapalika*. In this condition, along with accumulated *kapha, dantavalkala* or enamel also cracks and slowly the teeth decay into pieces. In another condition called *bhañjanaka* or cracked or fissured teeth due to vitiated *vāyu* and *kapha,* the mouth gets twisted sideways and teeth break. A carious tooth is called *kṛmidanta* in Ayurveda. Vāgbhaṭa's description of *kṛmidanta* is close to the pathogenesis of dental caries. When vitiated three doṣas with the predominance of *vāyu,* get localised in the roots of the teeth (*dantamūla*) filled with leftover food, it dries up the pulp of teeth, and worms are generated, resulting in the sudden onset of pain. There will be blackish discolouration of the teeth and oedema as well as blood-stained pus discharge from the gums. When *rakta* and *pitta* are vitiated and the teeth turn black or blue, the disease is called *syavadanta* or necrosed teeth. *Karala* is a condition when many teeth erupt irregularly due to vitiated *vāyu*. They appear ugly like improper dentition. *Dantacala* is a conditon when the teeth become loose and eating becomes painful. The Ayurvedic texts have described various treatments for several other dental diseases.

DISEASES OF THE TONGUE (JIHVĀROGAS)

Three types of diseases of the tongue, as described in the texts, viz. *vātika jihvākaṇṭaka, paittika jihhvākaṇṭaka* and *kaphaja jihvākaṇṭaka* are related to glossitis. In chronic glossitis, due to vitiated *vāyu*, cracks occur on the surface of the tongue which turns rough and loses the taste sense. *Paittika jihvākaṇṭaka* is characterized by burning sensation, yellowish discolouration of the tongue and the appearance of reddish thorn-like projections (*kaṇṭaka*), which correspond to acute superficial glossitis. In *kaphajakaṇṭaka,* tongue becomes heavy, thick and covered with fleshy growths like *śālmalī* (*Bombax malabaricum*) thorns. *Alāsa* or sublingual infected cyst or abscess is caused by vitiated *kapha* and *rakta* and inflammation below the tongue is seen. According to Vāgbhaṭa, after suppuration, a fishy odour comes out of it. This restricts the movement of the tongue and such a condition may be called in modern parlance, carcinoma of the tongue. The condition of *upajihvā* (*adhijihvā* according to Vāgbhaṭa) occurs due to vitiated *kapha* or

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rakta characterized by swelling on the tip of the tongue along with excessive salivation, itching and burning sensation.

Treatment : For *vātika jihvākaṇṭaka* the treatment is similar to that of *vātika oṣṭhakopa.* For *paittika jihvākaṇṭaka,* blood-letting, scrapping with rough leaves of *gojihvā* and *śephālikā* (*Nyctanthes arbor*) followed by rubbing the tongue by *Asperagus racemosus, Triospora cordifolia* and *Convolulus paniculatus, Sida cordifolia*, bamboo mana, lotus stalk, and liquorice. Rinsing the mouth and errhines are also advised. For treating *kaphaja jihvākaṇṭaka,* after blood-letting, medicated fine powders (*trikaṭucūrṇa* and *pippalyādi cūrṇa*) can be used for rubbing; besides, rinsing the mouth, errhines, gargling with white mustard seeds and rock salt are also recommended. For curing *upajihvā*, rubbing with barley ash is recommended after blood-letting. Medicated smoke inhalation, purgative errhines, and rinsing the mouth are prescribed. The ailment called *alasa* is said to be incurable according to Suśruta.

DISEASES OF THE PALATE (TĀLUGATAROGAS)

Galasuṇḍikā or *kaṇṭhaśuṇḍi* occurs due to vitiated *kapha* and *rakta* when the root of the palate swells. Thirst, cough and breathing difficulty are symptoms of the diseases. Vāgbhaṭa adds a few more symptoms—blocking sensation, irritation in the throat and sometimes vomiting. All this is related to uvulitis. *Tuṇḍikeri* or tonsillitis occurs due to vitiated *kapha* and *rakta* causing irritation, suppuration and pricking pain. *Adhruṣa* or palatitis is caused by vitiated *rakta* when swelling in the palate, fever, and intense pain occur. Adenoma of the palate or *kacchapa* happens due to vitiated *kapha* and it increases in size very slowly. Adenoma of the palate or fibroma (*māṃsa sanghāta*) is characterized by painless fleshy growth in the middle of the palate, and in *tālvarbuda* also due to the vitiated *rakta*, a fleshy growth resembling a lotus petal develops in the middle of the palate. *Tāludoṣa* is dryness of the palate and *tālupāka* is palatitis or ulceration of the palate.

Treatment : For treating diseases of the palate, gargling, rinsing the mouth, and inhalation of medicated smoke are advised. Excision by *maṇḍalāgra śastra* of *galaśuṇḍikā* may be made up to one third-part of the palate only. Later rubbing, gargling, and smoke therapy can be adopted to pacify *kapha*.The same method may be followed for *adhruṣa, tālvkacchapa, māṃsasanghāta. Tālvarbuda*, however, is incurable. For overcoming the dryness of the palate, sudation followed by pacifying procedures for *vāta* and *pitta* and for *tālupaka pitta,* some pacifying treatment may be followed.

DISORDERS OF THE THROAT (KAṆṬHAGATA ROGAS)

Five types of what is called *rohiṇi* have been described which correspond to various stages of diphtheria. When *vāta, pitta* and *kapha* get vitiated indivdually or together, along with the vitiated *rakta*, a fleshy growth in the throat is caused. Diphtheria, which could result

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in death occurs if not treated in time. When *vāta* is predominant, painful fleshy growths occur all around the tongue obstructing the throat causing severe dryness, pain in jaw and ears. In *pittajarohiṇi* fleshy growths appear in the throat causing severe burning sensation. Fever, delirium and hyperaesthesia in the throat follow and such a condition is related to toxemic stage of diphtheria. In *kaphajarohiṇi,* heaviness and sliminess in the throat occur leading slowly to suppuration. In *tridoṣajarohiṇi* all these symptoms exist and it is incurable. In *raktaja rohiṇi* fleshy growth is very high and it is also incurable.

Kaṇṭhosalıka is inflammation of the adenoids, or nasopharyngeal tonsil. Due to vitiated *kapha,* swelling in the throat like a thorn is seen, which causes obstruction in the throat.

There are several details regarding a disease called *adhijihvikā*, due to the vitiated *kapha* and blood. Likewise, retropharyngeal or peritonsillar abscess, carcinoma, or paralysis of the larynx, cellulitis, and other conditions have been explained in detail. The curative procedure for each of the diseases of the throat has been presented succinctly in the Ayurvedic texts.

Śālākyatantra is an important branch of Ayurveda. It should be said to the credit of the Ayurvedic sages and later practitioners, that they knew the nature and extent of diseases that afflict the supra-clavicular parts of the body, and developed effective curative methods, some of which are in no way inferior to the procedures that are being adopted as part of modern medical treatment.

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CHAPTER 7

Kaumārabhṛtya (Obstetrics, Gynaecology, Neonatology and Paediatrics)

P.V. Tewari

INTRODUCTION

Prasūtitantra (obstetrics), *strīroga* (gynaecology) and *bālaroga* (neonatology and paediatrics) have been described under *kaumārabhṛtya,* one of the eight branches of Ayurveda. Besides the care of a newborn child, the entire range of physiopathology of growth and developement of a girl, menstruation, impregnation, ante-natal, natal (except obstructed labour) and post-natal stages, and gynaecologic conditions have been described[1] along with the physiopathology peculiar to a woman that may influence her reproductive capabilities leading to the achievement of *kumāra* (a son).

In earlier times normal deliveries were conducted by experienced, multiparous women while obstetric surgery was done by a *śalyavid* (general surgeon). Though indirect reference to a female physician does appear in ancient classics, an unequivocal reference to a trained female obstetrician appears only in some texts of the sixteenth century.[2]

The importance of *kumāra* (a male child) and the absence of female physicians were probably the twin reasons for rather a brief description of gynaecologic entities in the texts. Even a few ambiguous statements like conception following sex only in a dream without any physical contact with a man[3] may also be due to these reasons.

A large number of unpublished manuscripts and the non-availability of even published books make it practically impossible to comprehend the exact dimensions of knowledge relating to the health care of women and children that was extant in earlier times. However, from the available literature, it is possible to understand several practices that were in vogue in this field.

A critical perusal of the literary sources reveals that, apart from the primary-sources *Caraka saṃhitā, Suśruta saṃhitā, Kāśyapa saṃhitā*, and Vāgbhaṭa's *Aṣṭāṅga saṃgraha*—there are some other texts in which stray additional references pertaining to the basic aspects of the

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subject are available, in addition to a large number of recipes including cosmetics, contraceptives and abortifacents.

An attempt is made in this chapter to present an account of the knowledge and practices regarding health care of women and children based mainly upon the following textual sources:

(i) Up to 5th century A.D.	: *Carakasaṃhitā; Suśrutasaṃhitā;* and *Nāvanītaka* Bower manuscript
(ii) 6th century	: *Aṣṭāṅgasangraha* of *Vṛddha Vāgbhaṭa*
(iii) 7th century	: *Aṣṭāṅgahṛdaya* of *Vāgbhaṭa; Bhelā saṃhitā, Kāśyapa saṃhitā;* and *Mādhavanidāna (second half)*
(iv) 9th century	: *Kalyānakāraka* and *Vṛnda Mādhava*
(v) 10th century	: *Cikitsā Kalikā* and *Haramekhalā*
(vi) 11th century	: *Rāja Mārtāṇḍa* and *Cakradatta* (commentator: Cakrapāṇi)
(vii) 12th and 13th century	: *Hārīta saṃhitā ; Gaḍanigraha; Vaṅgasena saṃhitā, Śāraṅgadhara saṃhitā; Kumāratantra; Yogaratna samuccaya, Vaidyamanoramā,* Commentators Ḍalhaṇa, Vijaya Rakṣita with Śrīkaṇthadatta, Indu and Aruṇadatta.
(viii) 14th and 15th century	: *Basava rājīyam*; commentator Āḍhamalla
(ix) 16th century	: *Bhāva prakāśa, Bālatantra;* and *Yogacandrikā;*
(x) 17th century	: *Yogaratnākara* and *Vaidyavinoda.*
(xi) 18th century	: *Bhaiṣajya Ratnāvali; Meghavinoda;* and *Vaidya rahasya.*
(xii) 19th century	: *Vaidya kalpadruma.*
(xiii) 20th century	: *Śubhaśantiyogaprakāśa* (1908); *cikitsā Candrodaya* (1922); *Harihara saṃhitā* (1939).

OBSTETRICS AND GYNAECOLOGY

Specific anatomy of Female

While the number and types of bones and joints of the male and female are identical, the female pelvis is relatively wider.[4] A woman possesses twenty extra muscles—five in each breasts or *stanyāśaya,* two at the entry of the ovum (Fallopian tubes), one at the entry of sperms (cervix), two spread in the anterior and posterior vaginal wall and three in uterus (fundus, corpus, and isthmus); muscles analogous to those of male penis and scrotum are found respectively in the clitoris and labia majora.[5]

The external genitalia consists of *bhaga* (*vulva*), a triangular structure similar to a leaf of *pippala* (of about 12 cm in circumference), the clitoris called *smarātapatra* or *manmathasthala* (an organ of high sexual excitement), and *sevanī* (perinial raphe).[6] The *yoni* or the canal between womb and external genital orifice is like a hollow central portion of a conch shell and

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it has three circles; and in the third, the uterus is attached.[7] The Ayurvedic texts have also given descriptions of the internal genitalia, the uterus, cervix, fallopian tubes and ovaries.[8] In addition, the vital parts of clinical importance (*marmas*), perinial raphe, urethra and urinary bladder, conduits that supply blood to the breasts, those for discharging menstrual blood as well as the capillary bed of internal organs (*ārtavavaha srotas*) causing infertility hypo-menorrhoea and neuralgic pain have been elaborately dealt with.[9]

Physiology of Menstruation

Premenarche changes, i.e. the development of breasts, pubic and axillary hair, vulva, the vagina or canal between the womb and the genital orifice, and the uterus take place due to the accumulation of *raja* (ovarian hormones). According to maturity as well as reproductive capacity, the span of a woman's life has been classified under *bālā mugdhā, prauḍhā* and *pragalbhā,* or *bālā, taruṇī, adhirūḍhā* and *vṛddhā.*[10]

It has been pointed out that, though the *raja* is present from early childhood, manifests itself as menarche at twelve years of age, a girl becomes mature for conception only at sixteen years, and the menopause ensues at fifty years of age. These are probable ages and can be influenced by diet, mode of life and health.[11] Details have also been given in the texts about the menstrual cycle, the associated comfort or discomfort, specific but rigorous mode of life during the four days of menstruation, and other related aspects.[12,13] Sexual intercourse with menstruating woman is contraindicated [14]

As the psychology of woman influences the psychosomatic constitution of her child, on the fourth day of menstruation after taking a head bath, she is advised, according to the texts, to first look at her husband, or the one whose character she wishes her child to have.[15] The period of optimum fertilization capacity (proliferative phase with ovulation) of twelve or sixteen days after menstruation is called *ṛtukāla,* after which the *yoni* would get constricted and would thus prevent the entry of *śukra* into the uterus.[16]

Ideal Environment for Conception

The best age for the first conception is said to be twenty-five and sixteen years for the male and female, respectively.[17] To have healthy progeny of desired qualities, an adult is advised to marry a healthy and beautiful girl with well integrated body parts, but of different lineage (*gotra*) and from a family which is free from contagious disease. A specific ritual called *putreṣṭiyajña* for begetting a child of good complexion and qualities has been described along with some details about the male female union.[18]

Factors for conception : Normal *ṛtu* (fertile period), *kṣetra* (reproductive organs), *bīja* (sperms and ovum), *aṃbu* (nutrient fluid), *vāyu* (nervous system governing muscular activity) and a happy mood of the couple during the union have also been dealt with giving high importance to the last.[19]

Progeny of desired sex : According to Ayurvedic texts, fertilization occuring on even or odd days from the fourth day of menstruation onwards, seed from right or left *nāḍi*

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(ovum from right or left ovary coming through the corresponding fallopian tube), earlier peak orgasm of male or female, and the dominance of *śukra* or *ārtava* result in the birth of son or daughter, respectively.[20]

A specific procedure known as *puṃsavanakarma* to get a son was practised. This was done during the asterism called *puṣya nakṣatra,* immediately after conception and the first missed period, but before the clear manifestation of embryonic body parts. A number of prescribed drugs were to be put into the right nostril of the woman, besides some prescribed oral administration.[21]

Embryology

There are interesting details about the formation of the embryo. Sperms (*saumya śukra*) discharged by male get mixed with ovum (*āgneya śoṇita*), then immediately *jīva* (self) is propelled by *sattva* but depending upon the deeds of the former life, enters and gets settled in the uterus (*kukṣi*), which is called *garbha* (zygote/embryo/ foetus). In the zygote four perceptile *mahābhūtas* i.e. *pṛthvī, jala, tejas,* and *vāyu* reach through the four sources i.e. from father with sperms, from mother with ovum, from nutrient *rasa* and *ākāśa* which is being automatically incorporated. The somatic constitution of the embryo depends upon the relative predominance of the sum of these *mahābhūtas*, while the psychic constitution depends upon *satva* and with its *vikāras* i.e. *rajas* and *tamas* (depending upon the deeds of the former life) entering the self, as well as the mental status of the couple during union of the woman during *ṛtukāla*.[22]

The embryo is a parasite upon the mother, being nourished during the first few weeks from the nutrients of maternal diet supplied to it through channels running all around with the process of *upasneha* (selective transfer of nutrients via chorionic villi encircling it), and after the development of placenta and umbilical cord through this passage with *upasneha* and also *upasveda* (osmosis).[23] From the *rasa* and *rakta* of the mother the umbilical cord and placenta develop, respectively. The *rakta/ārtava,* due to the obstruction to its exit channels by embryo, is propelled upwards, gets accumulated and forms the placenta which is attached to maternal heart and receives nutrients through pulsatile channels. The umbilical cord, which is attachd to the placenta and foetal umbilicus, develops a conduit for nutrients.[24]

The fertilized egg in the first month is called *kalala,*' which becomes solid in the second month. It would have five projections for the head and extremities, and *indriyas* (sense and motor organs), in the third month. Consciousness manifests itself in the fourth month, and body parts become clearer, in the fifth, besides more accumulation of flesh and blood, and psyche (*mana*) becoming enlightened. In the sixth month, the body hair, tendons, and bones develop; intellect (*buddhi*) gets active and *ojas* increases. By the seventh month,the foetus is complete with all the major and minor body parts and during the eighth month, the *ojas* is unstable and moves between the mother and foetus; thus delivery in this month is to be prevented by cleanliness, worship, etc.[25] The growth and development of the embryo depend to a greater extent upon *vāyu* and nutrients. *Vāyu* located in the umbilicus blows the *agni* which creates all major and minor parts. Division, metabolism, moistening, solidification, and inflation respectively are done by *vāyu, tejas, ap, pṛthvī* and *ākāśa*. Thus the various foetal

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bodily parts are derived from the *pañcamahābhūtas* as well as from the *ṣaḍbhāvas,* namely, mother, father, progenitors, nutrients, self, and psyche, according to Ayurveda.[26]

Though the environment during *putreṣṭiyajña* and the colour of spermatic fluid, diet as well as the mode of life of the mother, heredity, and region influence the complexion of the foetus, the texts state that complexion is formed from *tejas mahābhūta* in association with the other *mahābhūtas,* which influence it as follows : the association of *rakta, pitta,* and *śleṣma* and *tejas* results in red, yellowish or whitish eyes, and with *vāta,* in abnormal eyes.[27] It has been emphasized that all body parts develop simultaneously, and that the foetus does not cry nor excrete, but stays in a universally flexed attitude in the uterus.[28]

Twin pregnancy occurs, according to the Ayurvedic texts, due to an unreligious act of the couple, sex with a fickle mind, or division of *śukra, ārtava* by *vāyu* influenced by deeds of a previous life leading to the descent of two *jīvas.* From the portion of this division having predominance of *śukra* or *ārtava,* a son or daughter is born, respectively, the difference between their weights depending upon unequal division by *vāyu.* Fertilization, implantation, etc. of twins being identical, their features, etc. are similar. However, being two individuals, their nourishment and excretion differ.[29]

Teratologic abnormalities of the systems, complexion or colour and also of the sense and motor organs can develop due to the abnormalities of sperms, ovum, uterus, unreligiousness, union with an unfit woman, non-observation of restrictions and/or union during menstrual flow. The parental psychology during impregnation, nonfulfilment of pregnancy longings, diet and the mode of life of the pregnant woman which would cause the aggravation of *doṣas,* and their passage to the foetus, and diseases of the pregnant woman are also the causes of abnormalities. Consumption of the soup of buffalo meat and *mahāsūkara* treated with mustard oil causes congenital blindness; defective part of the seed (chromosome), or sub-division of *bīja* (gene) produces abnormality of that body part which develops from the related subdivision. according to Ayurvedic texts.[30]

Diagnosis of Pregnancy

Pregnancy is diagnosed on the basis of specific features. Immediately after fertilization the woman feels heaviness, sleepiness, horripilation, contentment, lassitude of the thighs, a feeling of beholding *śukra* and *śonita,* and twitching in the canal between the womb and genital orifice.

After the stabilization of the foetus, i.e. from the second month onwards symptoms such as amenorrhoea, aversion to food or smells occur. Vomiting, longing for sour articles, heaviness, sleepiness, swooning, yawning, heaviness and discharge from the breasts as well as blackening of the areola and lips, caused by the upward passage of *ārtava,* the leftover after placenta formation (placental hormones); a line of pigmentation in the lower abdomen and mild oedema of the feet also occur. Besides, the features depending upon the sex of the child during the fourth to seventh month of pregnancy or twin pregnancy, are stated to cause a trough-shaped abdominal contour.[31]

From the second to the fifth month of pregnancy, a majority of women express peculiar desires specially related to eating behaviour which are supposed to be the desires of foods expressed by the foetus through the mother via the channels that carry the nutrient fluid

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(*rasa*). At this stage, the pregnant woman is termed *dauhṛdinī* or one having two hearts— one of her own, and another of the foetus. Some of these desires are stated to be indicative of future physical, psychological or even social states of the newborn. If these desires are not fulfilled, the aggravated *vāta* of foetus can produce physical or psychological abnormalities.[32]

Ante-natal Care

Sincere efforts were made, then as now, to maintain proper hygiene, nutrition and happiness of the pregnant woman, lest her foetus is endangered. Hence, she was advised to maintain cleanliness, take a daily bath with medicated water, observe good conduct and behavior, and be in a happy mood. Wholesome diet especially the root of a plant called *kuraṇṭa,* and meat of iguana for foetal growth, meat soup, external and internal use of life prolonging (*jīvanīya*) drugs and those beneficial to the maintenance of foetus (*garbha sthāpaka*), were among a long list of indications and contraindications.[33]

To prevent ante-natal, natal, and post-natal complications and to ensure optimum growth and development of the foetus there were prescriptions. The diet, specially from the first to the ninth month with emphasis on consuming milk; meatsoup of certain animals from the fourth month onwards; ghee medicated with *gokṣura;* a diuretic in the sixth month; ghee prepared with drugs specific for every month and also boiled with oyster; enema with medicated oil in the eighth month and vaginal tampon impregnated with medicated oil during the ninth month were prescribed, with the emphasis that these regulation are beneficial for the proper growth and development of the foetus as well as to easy normal delivery after full term.[34]

General ailments : Among the ailments, namely, emaciation, vomiting, anorexia, discolouration, diarrhoea, and fever in pregnant women, the last two have been described in the texts in great detail. Their aetiology includes dieletic abnormalities, polluted water causing diarrhoea, and psychological trauma, as well as the role of pollens in fever. A febrile pregnant woman was advised only tisane or an infusion of dried. herb's up to the fourth month as the administration of drugs and evacuative measures, oleation and sudation are contraindicated because cleansing measures could produce a large number of complications during this period. The mode of treatment of fever, if any, after the fourth month depending upon the aggravation of *doṣas* as well as its complications were also known.[35] A pregnant women can be seized with any ailment that afflicts any adult. However, she also could suffer from conditions peculiar to pregnancy, including what are termed *revatī* and *jātahārīṇī.*

It is interesting to note that a pregnant woman is equated with a pot filled with oil. As the slightest oscillation spills the oil, so is the case with a pregnant woman inasmuch as the slightest mismanagement can produce serious complications. She is to be treated with soft, cold, gentle, pleasurable, and sweet drugs, while cleansing measures are contra-indicated except enema in the eighth month. Specific recipes for a large number of disorders of cardiorespiratory, digestive, and urinary systems, of skin, poisons, snakebite, and the like were developed. The emphasis was on the earliest treatment of *udvarta* (upward movement of abdominal gases with constipation) specially from the eighth month onwards with enema and the posture of the woman suitable for injection of the enema has also been prescribed. Even

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the features that are suggestive of death of a pregnant woman, her foetus, or born child have been described.[36]

***Ailments peculiar to pregnant women*:** Hyperemesis and *striaegravidrum* (*kikkisa*) have been explained under this category. Hyperemesis is caused by the neglect of pregnancy longings (nutritional), embryo/foetus (immune response) and abnormality of *vāta* (*reflex*).[37] It is to be treated with specific recipes, the intake of desired articles and congenial potions and diet. Causes for *striaegravidarum* i.e. the development of linear lines over skin of abdomen, breasts and thighs associated with itching are the *doṣas* that would be displaced by growing foetus and these are to be treated with local and oral recipes.[38]

***Conditions simulating pregnancy*:** Gaseous distension of the abdomen, (*vātodara*) which is to be treated with pacification of *vāta,* is sometimes confused with pregnancy. Likewise, amenorrhoea due to *vāta* associated with features of pregnancy i.e. breast changes etc. followed by vaginal bleeding without expulsion of a foetus (pseudocyesis) is termed by the ignorant as the foetus having been taken away by *bhūtas* or *naigameśa.* But Ayurvedic Vaidyas do not accept this view.[39]

***Abnormalities associated with foetus and the maintenance of pregnancy*:** (i) *Garbha śoṣa* or *kṣaya* (retardation of intrauterine growth) is due to the lack of proper nourishment of the foetus caused by the obstruction to its *rasavaha* (nutrient fluid) channels caused by *vāta*. This makes the foetus small with slow quivering and seizure with *vāta* ailments. Such a state is to be treated with anabolic and unctuous drugs like the root of *kuraṇṭa*, meat soup, specially iguana meat and milk. Gurbha Vṛdhi (macrosomia) i.e. an over-sized foetus causes over-distension of the abdomen, respiratory embarrassment and difficult labour, which are to be treated with such *vāta* suppressing measures as are harmless to the foetus.[40]

***Raktagulma (molar pregnancy)*:** A woman of active reproductive age suffers from this ailment due to the presence of uterus and menstruation. *Vāta* is aggravated due to the suppression of the urges, abnormal diet after abortion, delivery, or menstruation, fasting, scrapping and gynecological disorders. These obstruct the exit passage of menstruation and hence accumulated blood in the uterus produces amenorrhoea and the like. The clinical features that would likely to be confused with pregnancy, for which there are differeniating points of view, have been mentioned. Significantly, it is emphasized that where there is some confusion in respect of diagnosis, the opinion of other experts must be sought. This condition becomes easily curable after the tenth month, when it is to be treated with venesection, with other cleaning measures, oral medication, specially preparations like *laguda cūrṇa* and *vindu ghṛta* and vaginal pessaries till its complete expulsion. Surgical intervention is indicated only when medical treatment has failed. Features of incurability indicate malignant changes.[41]

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Abortions

The expulsion of the embryo-foetus upto the fourth month and in the fifth or sixth month is termed respectively *garbhasrāva* and *garbhapāta* as it is a discontinuation of pregnancy, hence it is also called *bhagnagarbha*. It has been stated that the embryo/foetus influenced by infection, mymometrial stimulation and trauma would fall down in the same way as a fruit due to the effect of *kṛmi*, wind and trauma. Conception as a result of union with a menstruating woman, or too young or too old a woman or a pregnant woman suffering from psychosomatic ailments or seized with what is called *jāṭahārinī* ends in abortion.[42] Abnormalities of sperms, ovum and ovarian hormones, menstrual period, diet, and mode of life which cause nutritional or psychological imbalance, abortifacient drugs, idiopathy, inflammation (chorioamnionitis) and its rupture, contraction of the upper part and dialatation of the lower part of the uterus are also stated to be the the causes for abortion. The Ayurvedic texts have also given details about the complications of abortion.[43]

Due to the association of *āma* in the embryo up to the third month of pregnancy, the preventive treatment being contrary is mostly ineffective. Yet according to the texts, cold and general treatment before its expulsion, and afterwards medicated soups, tisane, and also wine should be given so as to cleanse the uterus and relieve pain till its complete evacuation, because the retained products of conception would cause trouble repeatedly. Thereafter, oral unction, enema and digestive drugs should be used. After the third month, attempts should be made to encourage the woman by counselling, and make her rest on a comfortable bed. Cold bath, unction, internal and external use of a large number of recipes including oils like *aśvinayoga* and *siddhārtha taila* have been recommended. To a woman who is prone to abortion, milk boiled with specific drugs and the like are to be given from the first to the tenth or even twelfth month. Some magico-religious treatments have also been mentioned in the texts.

Missed abortions (upaviṣṭakagarbha; nāgodara or upaśuṣka garbha): After the fourth month of pregnancy, due to recurrent but scanty vaginal bleeding and other discharges, the vitiated *vāta* which withholds *kapha* and *pitta*, thus obstructing the foetal *rasavaha* channels hampers the growth of the foetus (*upavistaka*). In such conditions, the size of the uterus becomes static or decreases respectively. Besides specific symptoms of aggravated *vāta*, *pitta*, or *kapha* also manifest themselves. These conditions are to be treated initially with the measures that encourage foetal growth and development. In the event of their failure, the abortifacient procedure as well as the measures to normalize the specific (vitiated) *doṣa* should be adopted.[44]

Revati or Jātahariṇi: A communicable ailment called *revatī/jātaharinī*, affects a woman of active reproductive age during menstruation or pregnancy. It is transmitted through close physical contact with a carrier-woman and also through plants, birds, fish, reptiles, and quadrupeds (*tiraścīna*).[45] The Ayurvedic texts have classified it under thirty-four diseases according to prognosis. Specific names with clinical features i.e menstrual abnormalities, discharges, repeated abortions, stillbirths or neo-natal deaths have been mentioned in the texts. Expiation and bedewing are its treatment.[46]

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Sūtikāgāra (Accouchement place): The Ayurvedic classics have given details of accouchement place. Much ahead of the onset of labour, a ward/room for the parturient woman is to be constructed on the advice of an architect, with specific wood over clean earth of good quality and facing east, north or south (different opinions). It should be comfortable in all seasons and have good ventilation, sunlight, a separate kitchen, lavatory, bathroom, and specific places to keep fire, water, medicines and other necessary articles as well as instruments, and two wooden beds needed to manage normal or abnormal labour. There should be an untamed bull tethered outside. After properly fumigating and strewing *sarṣapa,* etc. to make the room insect-free and semi-sterile, the expectant woman is advised to enter it, in the beginning of her ninth month on an auspicious day, following a Brahmin and a cow, and stay there with multiparous, experienced, clean, sweet, and soft-natured women. To maintain proper humidity and hygiene respectively, a water filled earthen pot with wood constantly burning and specific drugs are to be kept.[47]

Normal labour

According to the texts, the process of labour is initiated by *vāyu* (termed *prasūtimāruta*) due to the influence of time, nature, detachment of foetus after its full maturity, and indifference of the foetus towards intra uterine stay during the ninth or tenth month; the abnormality being less in the eleventh and the twelfth months these are also included within normal periods). The head of the foetus being heavier occupies the lowest position, and with exaggerated flexion, descends downwards, the *prasūtimāruta* rotating it bringing the vertex downward and forward; and completes the expulsion of the foetus followed by the placenta.[48]

Prior to the exact labour, due to the descent of the foetus, the parturient woman feels laxity of the abdomen, release of cardiac bonds and the like. The normal situation of the foetus, dilatation of the cervix along with the uterine contraction (*āvī*) and secondary forces (*grāhi śūla*) indicate imminent labour. However, strong secondary forces and sluggish labour pains also influence the progress of labour. During the first stage the labour pains start, the woman feels languor, pain and discharges, followed by the liquid discharge of what the texts call the *amni.* There would be now further descent (*parivartana* of *garbha*) and increase in the intensity of labour pains. As a result, the foetus and placenta are expelled.[49]

The Ayurvedic texts have also given certain prescriptions. After the onset of labour pains, the pregnant woman is to be given an oil massage, a hot water bath and hot soup with ghee to drink, and is made to rest on a soft bed covered with a hide of a bull in supine position with flexed thighs. She is to be attended to by an experienced expert woman with trimmed nails and clean hands. During the first stage, repeated yawning, walking, massage, etc. are recommended, and in the inter-contraction period, inhalation or fumigation with drugs to increase uterine contractions (if needed) is advised. After the *parivartana* of *garbha*, psychological encouragement and certain instructions to exert, or 'bear down' efforts during contractions, are recommended.[50]

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Abnormal Labour

(i) ***Premature and postmature labour***: Vitiated *vāyu* expels a premature foetus, which is termed variously as *akālaprasava*, *viprasava* or *acirajāta*, its etiopathogenesis and management being like abortion. When this *vāyu* contracts the exit channels of the foetus, it overstays in the uterus and this is called *līngagarbha,* (post-maturity) which is to be treated with measures that would pacify *vāyu* as well as abdominal massage, and others to deliver the foetus.[51, 52, 53]

(ii) ***Intra-partum foetal death*** : Supperession of urges, a blow or impact on the abdomen, sitting constantly, standing or sleeping, in abnormal postures or in a disagreeable place, compression, psychosomatic ailments of the mother or foetus, influence of deeds of a former life of the mother or foetus, over-courageous or any other similar act by the mother, would aggravate *vāta*, thus having an adverse effect on the supply of nutrients (oxygen) and even killing the foetus. In such a condition, the foetus gets detached, transgresses the uterus and descending downwards, irritates the abdominal visceras, resulting in the aggravation of *apāna vāyu.* The clinical features at this stage are: Colic, absence of foetal movements, stony hardness of the abdomen, laboured breathing with an awful smell, and the like. According to Ayurvedic texts, this condition is to be treated with *mantras*, using an amulet of *uttariṇī* on the feet and adopting the methods described for placental expulsion. After delivery, *āsavas,* wine, anabolic satiating soups boiled with appetizing drugs, etc. are prescribed as suppressing measures for *vāta.*[54]

(iii) ***Uterine inertia (garbhasaṅga)***: It has been recognized that *vāyu* located in *śukra* causes delayed progress of labour due to uterine inertia. It is to be treated with fumigation of the vagina, and the application of certain pastes, as well as collyrium, chanting *mantras*, looking at *yantra* specially prepared with eight fragrances, placing a skull-bone of cow over the labour room, along with oral recipes.[55]

(vi) ***Obstructed labour (mūḍha garbha)***: When the progress of labour of a live or dead foetus having all body parts (after the seventh month) is arrested due to causes like macrosomia, abnormal foetal position and presentation, abnormality in the generative passage including cervical non-dilatation and perineal rigidity (due to psychogenic causes), ineffectual uterine action (due to malfunctioning of *apāna vāyu)*, abnormal dietetics and mode of life during the ante-natal period, it is called obstructed labour (*mūḍha garbha*). In this condition, the foetus gets fixed in the maternal passage with three modes, viz. head and thighs lie oblique or longitudinal and shoulders, in transverse position, though it has several other manifestations due to abnormalitity of *vāyu*. Ayurvedic texts have succinctly summarised them in the context of different types of abnormal positions of the bodyparts of the foetus, as well of the *doṣas* or vitiating factors.[56] Their effects on the mother and the foetus have also been described.

It has been emphasized that undesirable cases like these should always be handled by a wise, bold, and experienced accoucheuse/ accoucheur having a command over theoretical and practical knowledge, including the use of instruments and procedures as well as the experience of having successfully treated similar cases.

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According to the Ayurvedic texts, in the beginning, efforts should be made for normal delivery. For this purpose, fumigation and anointment of the canal, palm, forehead, lower abdomen and feet as well as the prescribed oral medicine should be undertaken.[57] If medical treatment fails to bring about the normal delivery, and the mother's condition deteriorates, manual extraction of the foetus, dead or alive, with due permission of the husband/guardian is recommended. Detailed descriptions have also been given with regard to the meticulous extraction of the foetus[58] by a surgical procedure followed with great care. In principle, the part of the foetus obstructing the maternal passage should be cut and the foetus followed by the placenta delivered. Post-surgical management includes a hot water bath, oil massage, tampon, sudation, congenial specific diet in accordance with the state of health of the mother and the like which should be continued at least for four months, use of cold water being specially beneficial.[59]

In full term pregnancy, if there is an omen like the accidental death specially of a goat, or quivering indicating the live state of the foetus, it is enjoined that laparotomy should be performed immediately and foetus delivered.

After the expulsion of the foetus, according to the Ayurvedic texts,[60] attendants should ensure that the entire planceta has been expelled, since its retention should cause complications like distension of abdomen, flatulence and foecal and urinary obstruction. The cause of placental retention is the vitiation of *vāta*. Hence all measures to pacify it should be employed to deliver the placenta and the uterus should be compressed between thumb and four fingers (similar to moderm Crede's method) and intra-abdominal pressure should be increased by inducing cough by causing in the woman irritation of her throat using a braid of hair or jerking. Further, the uterine contractions should be enhanced by tampon, fumigation and anointment of prescribed drugs over the palm, head, or lower abdomen and the adminstration of prescribed oral recipes, enemas or tying an amulet.When all these procedures fail, the manual removal of the foetus should be done. However, the obstetrician, while inserting the hands in the uterus, must follow the umbilical cord lest he should injure the uterus.[61]

(vi) ***Management of other complications of labour*** : Severe post-partum haemorrhage that occurs after delivery is advised to be treated immediately with specific drugs; and inversion or prolapse of the uterus, which develops after delivery, has to be attended immediately by an expert accoucheur. The Ayurvedic texts also state that fresh blood, either the mother's own discharged blood or that of the animal tethered outside (this blood being sterile would prevent infection and dryness of endometrium in inversion and provide lubrication) should be used for replacement. The vagina is to be filled repeatedly with medicated oil. Wine acts like nectar in this condition and may help in relieving pain and preventing shock. For healing ulcers which could develop during delivery, a large number of recipes have been prescribed—local applications or drugs to be taken orally, including wine mixed with drugs. There are also recipes for relieving breast pain.[62]

Puerperium

Depending upon the anatomic and physiological pre-pregnancy status of the reproductive organs, the puerperal period (*sūtikā kāla*) is said to be one and a half months, and the

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reappearance of menstruation, six months for an absolutely normal healthy woman having undergone easy delivery.

For one whose foetus has to be extracted the puerperal period is of four months. Specific dietetic management in such cases is also prescribed.[63]

According to the Ayurvedic texts, the reappearance of menstruation depends upon the replenishment of *dhātus* which would be lost during labour. Following steadiness of the body as well as psychological fitness, the blood accumulated in the uterus (cyclic changes of vascular apparatus of uterus) is to be discharged at an appropriate time. This accumulation depends upon the blood available for circulation in the whole body, including the reproductive system, which would be on the whole, slightly less in amount since the major part of *rasa* (nutrient fluid) of the mother's body is transferred into breast milk, and the blood is formed only from its remaining portion.[64]

Puerperal Management : Puerperal management should not be considered in isolation and due consideration should be given to family tradition, living place and even caste, according to the Ayurvedic texts. However, generally a puerperal woman should undergo initially whole body massage with lukewarm *balā* oil, sudation, irrigation with the prescribed group of drugs or those capable of paciying *vāta*.. For the expulsion of residual *doṣas* (for complete evacuation of the uterus) powdered *pippalī* and other drugs with warm jaggery water and ghee, or oil medicated with prescribed drugs should be administered to the woman.

She should be encouraged to rest in the knee-chest position, and her abdomen and back should also be massaged frequently. There are other details too in the texts for effective puerperal management including dietary regimen on a time-regulated basis.[65] To protect her from infections, the texts prescribe packets of specific drugs to be tied over the door frame of her room bed and around the neck of the woman; fumigation and incantation of specific *mantras* and the like besides a specific worship on the sixth night[66] have also been mentioned.

Puerperal disorders

A puerperal women can be afflicted with any disese like any other woman. However, the former's diseases could be either incurable or difficult to cure, since such diseases develop in a state of non-satiation caused by her carrying the foetus, bearing-down efforts, exhaustion during labour and the discharge of blood as well as the moisture from her body.

Cleansing measures being contraindicated these diseases are to be treated with methodical unction, oleation, sudation, tub baths and administration of life- prolonging, sweet, anabolic and *vāta* pacifying drugs.[67]

But for the two ailments called *makkalla* and *rakta vidradhi* there is no mention of any disease in the three major Ayurvedic classics (*bṛhattrayī*). However, in another important text, the *Kaśyapa saṃhitā*, 35 and 64 differenct ailments have been described in two places, as many as 25 diseases being common. Thus the *Kaśyapa saṃhitā* presents an account of a total

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of 74 conditions of all the systems of body, including immediate complications to late sequelae. However, except for puerperal fever, others have been just mentioned with a general aetiology. The treatments especially what is called *traivrta yoga,* is prescribed for all these.[68] One syndrome named *Sūtikāroga* is mentioned in *Mādhava nidāna* and its treatment has also been dealt with in later books.

(i) ***Puerperal after pains (makkalla śūla)***: In a puerperal woman with body dryness, either the blood is not expelled properly in-spite of the use of pungent drugs or is retained by *vāyu*, which produces a glandular swelling in the lower abdomen associated with severe spasmodic pain. This ailment is called *makkalla* or *pakkalla*. This is to be treated with specific decoctions, medicinal powders, *ariṣṭas* and wine mixed with the prescribed drug as well as by blood-letting through gourd or horn.[69]

(ii) ***Rakta vidradhi***: The woman suffering from puerperal after-pains having either a recent history of abortion or abnormal labour, suffers from pyogenic infection of the retained blood clots or products of conception. This is known as *rakta vidradhi*. It goes suppurated if does not subside within a week. The line of treatment for this condition is the same as that prescribed for treating internal abscess due to the vitiated *pitta*.[70]

(iii) ***Puerperal pyrexia (sūtikā jvara)***: This is one of the most troublesome diseases and is due to the aggravation of *doṣas* caused by an abnormal mode of life and dietetics with its specific aetiology. This disease is classified under the following heads on the basis of aetiology, namely, *endogenous* due to (a) individual *doṣa*, (b) *sannipāta*; and *exogenous* due to (c) breast engorgement (d) occurrence of milk fever and (e) due to seizure by *grahas* (infective). The clinical features, principles of treatment as well as specific treatment including external and internal use of medicinal pastes and decoctions have been prescribed[71] in the texts.

(iv) ***Sūtikāroga*** A puerperal woman sitting or exposed to direct air, using diet or a mode of life capable of aggravating *doṣas*, taking incompatible food, and also having indigestion, suffers from a syndrome named *sūtikāroga*. This is characterised by body ache, fever, convulsions, tremors, cough, thirst, heaviness of body, oedema or inflammation, colic, and diarrhoea either singularly or collectively *Sūtikāroga* is a serious ailment which is to be treated with specific medicinal powders, decoctions, *rasa* preparations processed metallic ones and other recipes.[72]

Contraception

At present, the termination of pregnancy is also considered as one of the methods to limit the family besides the use of contraceptives. Hence, both the methods are described below:

(i) ***Termination of pregnancy*** : Suśruta is the only ancient sage who has described the termination of pregnancy on medicinal ground, stating that if abnormality is likely to

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endanger maternal life, then without waiting for the full term of pregnancy, abortion should be induced, and in no case should the pregnant woman be neglected.[73] Nowadays, other causes like weakness of the pregnant woman, her being very young and other conditions are also taken into consideration.

Though the use of abortificient drugs are dealt with in the early Ayurvedic texts as the causes of abortion and obstructed labour, their description with certitude is missing in these texts. However, from the 9th to 10th century onwards, in travaginal/intra-cervical insertion of a root or leaf stalk of certain plants and also oral abortifacients came into practice, and the number of recipes for the termination of pregnancy increases, manifold later.[74]

(ii) ***Contraceptives*** : In the ancient Ayurvedic classics, sex life was duly recognized for procreation, but not for carnal or vicarious pleasure. Alongside celibacy was also given much importance. Nevertheless, one does find references in the texts to the most fertile period (*ṛtukāla* or ovulation period) as well as specific postures of women to avoid impregnation. Such descriptions can provide an insight into the idea of the safe period, and incomplete union, respectively. However, it should be emphasized that the texts do not mention any specific contraceptive. The first available reference in Ayurvedic literature is in the *Haramekhala*, wherein three recipes for intra-vaginal application and a fourth one to be tied to the waist regions have been prescribed. Two prescriptions given in *Cakradatta* (later period) for the destruction of *rajas* could also be taken as oral contraceptives on the analogy that once the *rajas* is destroyed, the question of conception does not arise. All these recipes are repeated in the other later texts. There is also an unequivocal description of two oral contraceptives in a text of the sixteenth century. The list of recipes for the four categories, namely, intravaginal application, tying a contrivance over the body parts, destruction of *raja* and oral contraceptives increased manyfold in the later period. In the early twentieth century, contraceptives to be used by male partner also came into practice.[75] The drugs used intra-vaginally are mostly spermicidal ones or those which would act as a mechanical barrier. The recipes employed orally to destroy *raja* or for contraception are mostly anti-implantation agents.

Gynecological Disorders

All the gynecological disorders have been broadly categorized under four heads : (i) those which influence anatomic components of the reproductive organs or the ailments of *yoni;* (ii) menstrual disorders, infertility and related conditions; (iii) utero-vaginal displacement, dyspareunia,as well as nymphomania and (iv) other sexual incompatibilities, backache and infections which are included under *yoni vyāpad.*(see below).

Ailments of anatomic components of reproductive system (yoni)

Four entities with the word *yoni* as prefix have been described in the Ayurvedic classics, namely, *yoni-vyāpad, yonikānda, yonyarśa* and *yonidurmāṃsa*, which are being discussed below.

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(a) ***Yoni-vyāpad*** : Except one author of relatively later period who has classified these diseases under four heads, all the other authors of Ayurvedic texts have given the number of these ailments as twenty. However, in the *Caraka saṃhitā*, the treatments for twenty-one ailments have been described, which indicate the plurality of ailments. All the same a general etiopathogenesis applicable to all these diseases as well as specific etiopathogenesis have also been described.

Due to abnormal dietetics and mode of life which would aggravate different *doṣas*, sex in abnormal posture or with a young girl by a mature man, the use of other objects for sexual pleasure, abnormalities of the ovarian hormones, and of *bīja* (chromosomal/ genetic abnormalities) on the one hand and, on the other, idiopathic and related causes, vitiate the *doṣas* which would reach the reproductive organs, and interact with the dhatus, like *māṃsa* (flesh), *rasa* (nutrient fluid) and *rakta* (blood) thus causing various gynecological ailments. However, there is difference of opinion about the causative *doṣa*; its nomenclature and clinical features among the authors of the three Ayurvedic classics which, in turn, are mainly followed by later authors. On the basis of the collective opinion of all the authors, the actual number of disorders (*yoni vyāpad*) is twenty-six. These are in modern medical terminology endometriosis/oestrogen deficiency, acute inflammation/suppuration of the reproductive organs; trichomonal vulva-vaginitis; acute infection of reproductive organs associated with systemic features, dysfunctional uterine bleeding; cervical erosion with ulceration, secondary amenorrhoea, constitutional nymphomania, infertility due to sexual incompatibility, vaginitis with infertility due to excessive coitus; sacral pain, monilial vulvo-vaginits during pregnancy, acute infection; dyspareunia; spasmodic dysmonorrhoea, repeated abortion or pre-natal death, retroversion or retroflexion of uterus, pinhole cervix, marked oestrogen deficiency, effluvium seminis; congenital gonadotrophin deficiency or absence, procidentia, congenital absence of uterus, pre-sacral neuralgia, second degree uterine prolapse, nymphomania due to psychosis, and prolapse of the vaginal wall. If the above ailments are not treated properly, the woman may suffer from *gulma*, piles, monometrorrhagia, along with other disorders of *vāta* and become infertile.[76] The technical words in Sanskrit which have not been given here for these ailments are full of meaning and reveal the acumen of the classical Ayurvedic authors.

According to Ayurveda, *vāta-doṣa* is the principal cause of all the gynecological disorders, and therefore, first of all it should be pacified. For this purpose, besides the use of unction of the concerned region, sudation, gentle cleansing with mild emesis, purgation, sternutation, evacuative and nutritive enemas are the curative general measures. The other palliative step is the instillation of prescribed drugs in the uterus and in the vagina as a specific treatment. However, this measure is to be adopted after the cessation of menstrual bleeding, but within sixteen days of the cycle (*ṛtukāla*). The texts emphasize the benefits of local unction, irrigation and tampons. Medicated powders, decoctions, tisanes, milk and ghee cooked with specific drugs, *rasa* or metallic preparations, *āsavas, ariṣṭas* (fermented drugs), recipes for enema have also been prescribed as general treatment. There are also in the texts details of certain treatments for individual disorders as well as symptomatic treatment for excessive roughness or stiffness, laxity, dilatation and displacement of vagina.[77] Though surgical treatment for specific conditions of *yoni* (introitus or cervix) is mentioned, in the texts, the exact procedure for operation is missing in them.[78]

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(b) Cervical warts or condylomata acuminata (yonyarśa) : The *doṣas* which become aggravated due to abnormal dietetics and mode of life, reach the reproductive organs and produce muscular protuberances, associated with blood as well as mixed foul smelling discharges which result in several complications in the genital region. The texts have recommended their destruction by *kṣāra* or *agni* (chemical or thermal cauterzation) and then healing the wound by the local application of certain types ointments.[79]

(c) ***Bartholinitis/Bartholin's abscess (yonikanda*** or ***bhāgaphala)*** : Owing to the aggravation of *doṣas* as well as ulceration caused by nails, teeth, or other sharp edges, a disease characterized by a red coloured and fluctuating swelling which resembles a fruit of *lakuca* (a round fruit having a ridged appearance) develops in the vulva depending upon the extent of the predominance of *doṣas.* This aliment is classified under four heads as being due to (i) *vāta,* (ii) *pitta,* (iii) *kapha* and (iv) *sannipāta* each having its specific features. Applications of medicated fillings or tampons are the recommended treatments.[80]

(d) ***Infected cervical polyp or ulcer with over granulation tissue (yonidurmāṃsa)*** : As a result of *vāta* inside, abnormal muscular structure develops in the vaginal canal or on the cervix (mouth of uterus). This can be cured by the local application of prescribed recipes.[81]

(e) ***Menstrual disorders*** : Certain types of *yonivyāpad* are characterized by menstrual abnormalities, amnenorrhoea, hypomenorrhoea, menometrorrhagia, dysmenorrhoea and irregular bleeding per vaginum. Their causes and cures including appropriate diet and general treatment have been described in the texts along with specific pathologies of (eight in number) *ārtava* states and their curative methods.[82-86]

(3) Infertility (vandhyatva)

There is in the Ayurvedic texts a description of an entity called *vandhya* (caused by chromosomal or genetic abnormality) characterized by the congenital absence of the uterus and menstruation and a gynecological disorder. However, *vandhyā* denoting secondary amenorrhoea [87] as well as the failure to achieve conception, due to union in an abnormal posture or at an inappropriate time or as a complication of gynecological and menstrual disorders, or infertility (*vandhyatva*) as an independent disease have not been described in ancient classics except Hārīta saṃhitā. In this text only begetting a male child is taken as a fertile state, while repeated abortions, stillbirths, or even birth of only female children, are considered as infertility.

Abnormalities in respect of factors that are essential for conception—injury to the uterus or its vascular apparatus, nutritional deficiency, destruction of seed and/ or menstruation either due to strong emetics and purgatives given to a woman, undesirable effects of the three *doṣas*, ulcers and displacement of the cervix, on the uterus, the eight abnormalities of woman caused by the three doṣas, blood and others, deficiency of male reproductive essence as well as its desiccation and allied aspects have also been included among the causes.[88] Variation in

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the classification and clinical features, however, have not been found for any other obstetric or gynaecological ailment in the Ayurvedic classics. Nevertheless, there are classifications under three to eight heads, which include primary infertility, secondary infertility after one child, repeated stillbirths, abortions, and the like, with their clinical features.[89]

To investigate the fertilization capacity, the Ayurvedic texts have prescribed a test as follows: The couple are advised to give their urine samples separately in pots filled with *mudga* (horse gram), or in those filled with wheat or barley. The pots are kept for one day for horse gram or for a week for wheat or barley. If the seeds germinate in the pots, it would indicate the fertile state of the individual. The texts also state that if the husband's urine is frothy and his reproductive essence sinks in water, he could be regarded as being potent.[90] Several recipes have also been prescribed for curing the infertility of a woman.[91]

Other disorders

(a) ***Polyuria or somaroga***: A hypothesis has been propounded in the texts of the medieval period that women do not suffer from urinary ailments (*prameha*) as their body is cleansed every month due to menstrual discharges and however, a disease called *somaroga* characterized by an increase in the frequency as well as the quantity of urine develops a sorrowful state, due to the use of purgatives, poisons, and even magical spells. The texts have also given details of the treatment of this disease, describing *mūtrātisāra* (polyuria) as being its complication.[92]

(b) ***Leucorrhoea or śvetapradara*** (***yonisrāva*** and ***asthisrāva***) : Though one does find a good number of recipes prescribed in the texts for symptomatic relief of white watery discharges from the vagina, this condition has not been described as an independent disease. In the latter works, however, a disease named *asthirsrāva* (even today some women feel that their bones are softening or discharging and thus they are becoming weak) has been dealt with. This is stated to be the combustion of *rasa* (essence) and the decline in bone strength. This condition is characterized by discharges in the genital region. The texts have also given methods for its treatment. [93]

(c) ***Uterine polyp (vaṣṭi roga)***: This would be in the nature of a nodular structure produced by *vāta* and characterized by severe pain in the lower abdomen and groin, and associated with blackish and scanty menstrual discharge. The texts state that it could be treated with certain local and oral drugs. [94]

(d) ***Congenital malformations***: Due to the abnormality of chromosomes (*bījabhāga*) or genes (*bījabhāgāvayava*) such as a woman without a uterus (hermaphrodite) or a uterus having a pinhole cervix, or the absence of breasts (hypopituitarism) or other abnormalities of the vulva, cervix or uterus, congennital malfunctions occur.[95]

(e) ***Sexually transmitted diseases***: Though there are textual descriptions of two such diseases, *upadaṃśa* (granuloma inguinale) and *phiraṅga* (syphilis), and the texts state that they pertain to males only, it has been recognized that these diseases would also inflict females.

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It may not be out of place here to state that Ayurvedic texts have given due consideration to sexual intercourse and the associated conjugal aspects, as well as how to overcome frigidity in the couple.[96] Recipes of cosmetic nature have also been dealt with in respect of the female organs.[97]

Specific gynecological instruments

An account of gynecology as presented in Ayurvedic texts would be incomplete if no reference is made to the instruments that are dealt with in the texts. The *uttara basti yantra* (catheter for insertion in the urethra); *yoni vraṇekṣaṇa yantra* for examining ulcers in the genital canal or cervix and *yoni prakṣālana* or *abhyaga yantra* for irrigating or washing cervical ulcers, have been described in detail.[98] These instruments are somewhat similar to bivalve speculum used today.

Breasts and Their Disorders

There are succinct descriptions in the texts about the breasts, the best once suited for easy suckling, the unfit ones and other aspects.[99] Even a view has been expressed that the evil eye can cause undesirable effects which are to be treated by certain tantric rites.[100]

It has been stated that if a lactating mother ingests tiny pieces of materials like stone, bone, hair or any other hard object (termed *vajra*) due to negligence, such an object would reach the breasts and produce acute inflammation, the clinical features depending upon the dominance of the associated *doṣa* . Such hard objects could be expelled either while suckling or by squeezing the breast, the wet nurse specially being advised to guard herself against such a condition.[101]

The texts have recognized that, just as in other body parts, five types of external abscesses also develop in breasts due to specific eatiopathogenesis and exhibit respective clinical features. These are to be treated with irrigations specially with hot water mixed with rock salt, combing, anointments, and also surgical drainage of pus, when necessary. However, while conducting surgery, special care should be taken to protect the milk carrying channels.[102]

Wet nurse

In the absence of mother's milk either due to her illness or inability to suckle the child, a wet nurse could be engaged. It has been stressed that she should be young/middle aged, beautiful, clean, healthy and good-natured having her own child alive and a good quantity of milk in her breasts. It must, however, be ensured that the psyche of the wet nurse should be like that of the child and that she hails from the same caste as that of the mother. Further, she should be throughly examined both •physiologically and psychologically, and found fit to be appointed a wet nurse. It has been explicitly stated that a frequent change of wet nurse should be avoided as this is likely to result in diseases

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to the child. A wet nurse was looked upon with approbation as she suckled the newborn. In order to maintain her *doṣas* in equilibrium and good hygiene she was advised to use cleansing therapy, take a balanced diet,as well as massage, unction, baths, wear clean clothes, and use cold water to control her *pitta*, and digestive fire, otherwise, she would be unable to produce *rasa,* (nutrient fluid) of good quality. Details of treatment of abnormalities in her diqestive fire, and other diseases have been given along with the qualities and character of a woman unfit for appointment as a wet nurse. A multiparous woman of *vāta* or *pitta* constitution, inspite of her ability to provide sufficient breast milk, was considered unfit, as her milk might make the child lame, dull, and dumb, according to the Ayurvedic texts.[103]

***Formation and properties of breast milk*:** After delivery, generally on the third or fourth day the *rasa* reaches the breasts due to the dilatation of channels and is transformed into breast milk. Thus breast milk is the *upadhātu* (byproduct) or the essence of *rasa dhātu.* According to the Ayurvedic texts, generally the quantity of breast milk ejected at one time is about two ounces (*two anjali*), the affection to the child being the most important for milk ejection.[104]

Pure breast milk is white like a conch shell in colour, frothless, and mixes well with water. It provides vitality to the child, is anabolic, wholesome, sweet with an astringent aftertaste, unctuous, vivifying, light, appetizer and warm, and maintains the *doṣas* of the child in a balanced state. The breast milk of dark complexioned woman is said to be the best.[105]

Procedure to initiate breast feeding : The initiation of breastfeeding was a ritualistic one then as now. On any auspicious day, the mother, after taking head bath, anointing herself and tyeing an amulet made of *brāhmī* and the like, is advised to sit facing east and sqeeze the breast to confirm free flow of milk; then the child having already been given a bath and wrapped in new clothes is placed on the mother's lap, keeping the head of the child towards the north. Thereafter, a specific hymn is to be recited and the mother is asked to suckle the child first on the right breast.[106] There are some details regarding the unfit conditions of mother and child for breastfeeding.[107]

Disorders of breast milk : Disorders that are either of its quantity or quality of breast milk have also been described. As for its quanity it is pointed out that the physical, physiological, as well as psychological factors would reduce the milk. More importantly, it has been mentioned that galacatagogue drugs and others like *vajrakañjika* and *pañcajīraka guḍa,* along with a diet that would increase nutritional status of the mother, could be employed as therapeutic measures, while, emesis is contraindicated.[108] Cleansing and appropriate pacificatory treatments have also been indicated, in case of over production of milk, when the breasts become heavy and painful as a result of the repeated secretion of milk.[109]

It has also been pointed out that due to indigestion diseases of the body or mind, day-sleeping, lack of excercise, trauma, overuse of cleansing measures, anger, eating non-

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congenial or incompatible food, and several other factors, would vitiate of the *doṣas* (*vāta, pitta*, and *kapha*) which produce disorders in the quantity and quality of milk.

Specific aetiopathogenesis of as many as eight milk disorders has also been described.[110] These disorders have been classified on the basis of their aetiology under three, four, or five heads due to the related *doṣas* and others.[111] Besides, specific features in consonance with the names of eight milk disorders including their colour, taste, smell, and other characteristics have been elucidated in the Ayurvedic texts.[112]

It has been emphasized that the treatment should be planned according to the aggravation of *doṣa*, after oleation and sudation, emesis, purgation, and enema followed by regulated diet. Recipes for the purification of milk and also specifics for the eight milk disorders have been described.[113]

Substitute milk : In the case of the non-availability of human milk, the milk of a cow or goat boiled with *langhupañcamūla* or only *sthirā,* and mixed with sugar should be given, according to the texts.[114]

NEONATOLOGY AND PAEDIATRICS

Childhood age (bālāvastha)

The span of this state is said to be ten, sixteen or thirty years depending upon pre-puberty, full physical maturity, and psychological maturity. However, the commonly accepted duration is up to sixteen years. During this span, the *dhātus,* physical strength, and complexion are not fully mature, *kapha* is dominant and the body is delicate, and hence it cannot withstand stress and strain.[115]

On the basis of growth and development, this span is further subdivided into three, namely, foetal stage (*garbha*), childhood (*bāla*) and puberty (*kaumāra*); according to dietetic requirments, only milk as the principal diet (*kṣīrāda*), milk and cereals both equally needed (*kṣīrānnāda*) and cereals diet (*annāda*) respectively.[116]

Resuscitation of asphyxiated newborn

To resuscitate the unconscious with the absence of crying, or restless child, due to instability of *dhātus* and hyperaesthesia, and to produce auditory or sensory stimulation, the sound produced by the impact of two stones near the ear, is recommended by the texts. In consonance with the season sprinkiling of hot or cold water on the face, and fanning with a winnowing basket or a similar contrivance could be resorted to in order to provide fresh air. As a concomitant ritual, *mantras* are recited in the right ear of the newborn. Irrigation with *balā* oil is also recommended.[117] There are elaborate details in the texts about the immediate care of the newborn.[118]

Feeding during the first four days

After performing jātakarma, to increase intellect, strength, immunity and longevity of the *newborn, powdered* gold in a minute quantity with a paste of prescribed drugs is to be

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given to it. In a progressively increasing manner depending upon the digestive capacity and strength of the child, honey and ghee followed by breast milk, or consecrated honey, ghee and *anantā* on the first day; ghee, with *lakṣmaṇā* on the second, the third and the fourth day, after feeding twice with honey and ghee, breast milk is to be given, as advised by the texts.[119]

General care and behaviour with the child

It is interesting to note that the Ayurvedic texts have also dealt with the care of and behaviour with the child. The ears of the child are to be covered with an oil-soaked cotton tampon, the child is to be wrapped with soft linen cloth and made to sleep, generally keeping the head eastwards. To maintain humidity in the room, water-filled earthen pots are to be kept; daily massage with medicated oils, application of unguents followed either by a bath with medicated water or sponging every day, and fumigation specially for protecting the child from seizure by evil spirits are to be carried out. Oil massage of the child's body induces good sleep. Several other guidelines have also been given[120] along with the measures for the protection of the newborn which would increase its humoural immunity and also maintain the environment free from infection.[121] Clinical and/or experimental work done for the last two decaded on several single drugs as well as recipes which have been prescribed in the Ayurvedic texts, has confirmed that their methodical use would increase even non-specific humoral immunity. In tune with the traditional customs, there are references in the texts to fumigation using specific drugs to ward off evil spirits, tieing amulets, offering special worship and the like as cleansing practices.[122]

First physical examination of the child

Detailed and thorough physical examinations of all major and minor body parts of the child their proportionate size measured in terms of *aṅgulas* (less than an English inch) of the child, its physiological activites (voice, sucking, excretion, sleep, cry, smile etc) are carried out to find out any congenital anomaly, and the child's probable longevity (*āyuparīkaṣā*) as well as the general future of the child.[123] The Āyurvedic texts have also dealt with the place or abode for the child, maintenance of infection-free environment and the child's clothing, bed, playground, toys, naming ceremony, and the like—all of these indicating comprehensive Āyurvedic approach to the child care.[124 to 126].

Apart from these, as the texts point out, during the first month of the child, the rising sun and moon are to be shown to the child and their worship performed. In the fourth month of the child or according to family tradition, after ablutions and a bath adornment, and dressing with new clothes, the child, along with certain plant drugs, should be taken out of its living place and again specific worship is to be performed. Then it is made to re-enter the room with the recitation of *mantras*. However, the child is not to be exposed to the sun, fire, etc. at least up to one year of age.[127] In the fifth or the sixth month, the

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child is enabled to sit for a short duration with a ritualistic approach, and the practice repeated daily. Making the child sit for a longer duration is contraindicated as it would cause physical deformity.[128]

Weaning

After the appearance of the teeth in the child, then as now, gradual weaning was done. In its place, medicated milk as well as light and digestible nutrient cereals were the substitutes weaning at the age of three years by applying a paste of neem leaves on to the nipples (bitter taste) was also advised . Fruit juices in small quantities were prescribed to be given to the child from its sixth month.[129]

Cereal feeding (annaprāśana saṃskāra) : Initiation of cereal feeding was considered as a ritual, then as now, and this was to be started from the sixth month of the child on an auspicious constellation. After some worship and with the recitation of *mantras*, the first feeding is to be either light or easily digestible cereals, specially made by cooking several types of grains together, or minced cooked meat of different birds/animals, but in small quantity. Special diets in the case of diarrhoea and also in conditions of the predominance of *pitta* have been recommended.[130]

Dentition

That extraordinary attention is to be bestowed on the child's dentition is revealed by the details provided by the ancient texts. The eruption of teeth over the months was keenly observed in all their intricacies. The first eruption of the upper teeth was believed to be fatal to the parents and hence propitiatory prayers were offered at that time.[131] The physiological disorders associated with the appearance of teeth were well understood. Though these disorders do not require any treatment since they subside naturally in course of time, a physician should prescribe appropriate treatment[132], after the complete eruption of the teeth and after examining the *doṣa,* disease, its location, severity,place and time. Dry powder of certain drugs or dry meat of quail birds was advised for rubbing over gums, and medicated ghee, for the easy eruption of teeth.[133]

Other saṃskāras of the child

There are details in the texts about the ear-piercing (*karṇavedhana*), and the treatment of its complications if there are any, tonsure, initiation of the child to education, and thread ceremony.[134, 135] These traditions are alive even today, specially among the first three castes.

Dosage of medicine for children : The traditional practice was as follows: The intended drugs were softened generally with milk and administered in smaller doses, (the quantity

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of drug to be held between two phalanges, equal in size to that of a kernel of *jujube* fruit or of *jujube* fruit itself was advised to be given to a child up to its one year and one to two years, and later, respectively.) The dose should be increased gradually according to the age of the child.[136] To the just born child, a powdered drug electuary or a paste equal to the size of a fruit of *viḍaṅga* mixed with honey and ghee was prescribed. In the first month, one *ratti* (appromimately 120 gm) of the drug mixed with honey, ghee, milk, and sugar, should be given, which could be increased by one *ratti* every month till one year of the child; thereafter, the quantity of the drug may be increased by one *māṣa* (approx 1g) every year till the age of sixteen years. While the dose of decoctions should be four times.[137] The *Kaśyapasaṃhitā* has elaborate details concerning the dosages vis-a vis the age of the child.[138]

Mode of drug administration to the child: To a child which depends only on milk (*kṣīrapa*), generally the medicine should be given only to the wetnurse, and not to the child. However, if needed, mild as well as non-irritant drugs in appropriate dosage mixed with milk and ghee may be given. Alternatively, a paste of the prescribed drugs should be applied over the breasts of the wet-nurse, after washing her breasts, and the child could then be suckled. To a child taking cereals along with milk, the drugs should be given to the mother or wet-nurse as well as to the child. In the case of the child who is eating mainly cereals, appropriate medicine as prescribed by a physician could be administered.[139] Some other physicians opine that up to three months of age, the drugs mixed with breast milk could be given. Beyond three months, however, prescribed drugs mixed with water could be administered.[140]

Method of diagnosis of paediatric ailments

As the child cannot explain its trouble or ailment, the diagnosis should be based on the specific features keenly observed by a physician. Generally, the child repeatedly touches the ailing part and cries if that part is touched by others. The diagnostic features of a host of diseases—of the head, abdomen and urinary bladder and disorders, such as colic, flatulence, constipation, ear ache, diseases of the mouth, inflammation and pain in the throat, facial palsy, epiglottitis, fever, diarrhoea, vomiting, dyspnoea, hiccough, thirst, epilepsy, insanity, dysuria, piles, vesical calculus, erysipelas, cholera (*viśūcikā*), sluggish movement of the bowels (*ālasaka* or paralytic ileus), eye disorders, *āma*-disorders, itching, anaemia, jaundice, chronic coryza, injury to the chest wall, insect bite, and what are called the *graha rogas,* caused by supernatural malefics) have been described in Āyurvedic texts.[141]

Principles of treatment of paediatric ailments

After examining very carefully the constitution of the child, aetiology, prodroma, signs, symptoms, and therapeutic suitability as well as other factors, the treatment with sweet

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or astringent, mild or light, but fragrant, soft, and cold beneficial drugs should be administered to the child, giving due consideration to the place and season. Excessively unctuous, rough, hot, sour or pungent in *vipāka* or heavy drugs and diet, and emesis are contraindicated in children.[142] Except in acute conditions, purgation should not be adopted. Because of the consumption of milk and ghee, the children are always unctuous and hence gentle emesis should immediately be induced; instead of purgation, enema and nasal instillation should be given; but sharp treatments like purgation and evacuation should be given only to the wet nurse. With the cleansing of the body of the wet nurse, it is believed that the vitiating factors would subside.[143]

Desiccation, excessive cleaning, and blood-letting are contraindicated in children. The Āyurvedic texts also describe the nature and the manner of the other types of treatments for curing paediatric ailments.[144]

Diseases of children

Diseases of children have been classified under three headings: (i) congenital anomalies; (ii) fevers and general disorders; and (iii) disorders peculiar to childhood.

Congenital anomalies

These disorders include, as noted before, deaf, dumb, lame, hump-backed, dwarf, hoarse-voiced and even unintelligent childern. Such children are supposed to be born to the mother who had consumed such diet as would be capable of aggravating *vāta*. The diet likely to aggravate *vāta, pitta* and *kapha* is also supposed to produce the disorders seen in later life, such as premature greying of hair, baldness, absence of hair on the face, and tawny complexion (due to *pitta*), and *kuṣṭha,* skin disorders, *kilāsa,* birth with teeth and the like (due to *kapha*).[145]

The Ayurvedic texts have also described several other congenital disorders like contracture of the ear pinna due to *vāta,* imperforated anus and the absence of other external apertures along with their surgical treatment.[146] *Kuṣṭha*, piles, and urinary disorders are stated to have a genetic predisposition due to the abnormalities of the sperm or ovum.[147]

Fevers and general disorders

Though the disorders or diseases of adults and children are practically identical, the difference is that for children, the quantum of vitiated *doṣas* and *dūṣyas* is less, the curative procedure is less intense, and the dosage of medicine is also less. In any case, for children, cauterization, application of alkalies, emesis, purgation, and venesection should not be adopted. However, in the event of the severity of a disease of a child, mild emetics, purgatives and enema could be prescribed. The breast milk of the mother or wet nurse of a febrile child should first be purified.[148]

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Besides these general principles, specific recipes including what is called the *kāśyapīya guṭika* with different after-drinks have been prescribed for the treatment of a child if it suffers from diarrhorea, with or without *āma,* vomiting, dysentery, constipation with flatulence, fever, *grāhaṇī roga,* repeated vomiting after taking milk, hiccups, a disease called *tālupāta,* abdominal disorders, colic, and several other diseases.[149]

Causes of wounds in children, their clinical features and treatment with contraindications for incision of a wound of the vital parts, have also been mentioned.[150]

Specific treatment for various eye disorders (itching and burning sensation, pain, dimness of vision, new growths on the eyes, and opacity), nasal ailments, ear disorders (earache and otorrhoea), diseases of the head, tooth caries, lip disorders and stomatitis, various poisons including snake bite, scorpion sting and dog bite as well as certain recipes for the improvement of general health or *rasāyana*, and the recipes to make the child handsome, fragrant, and intelligent have been dealt with.[151]

Specific paediatric disorders

It is well known that there are certain disorders which would exclusively affict children and this aspect engaged the attention of the Ayurvedic sages who therefore, have dealt with them in a succienct manner.

(a) ***Disorders due to improper natal or post-natal management***:(i) *Upaśīrṣa* (capute succedaneum or cephal haematoma): Due to the vitiation of *vāyu* in the foetus, a skin-coloured painless swelling develops over the scalp immediately after birth; it is to be treated with measures to suppress *vāta,* nasal therapy, and like an abscess after suppuration.[152] (ii) Due to improper emesis of the fluid, *amni,* or as a result of an admixture of mucus in the throat, the *rasa* of the cardiac region causes obstruction to the channels. Thus the child clenches its fists, becomes unconscious, suffers from cardiac ailments, convulsions, cough, dyspnoea and fever. This disease is termed *ulbaka, sahaja or aṃbupūrṇa* (aspiration pneumonia). While massaging and bathing to the suffering child are contraindicated, other recipes have been prescribed for the treatment of this disease. [153]

(b) ***Diseases relating to the umbilical cord***: Owing to the improper cutting of the umbilical cord, there may be protuberance in its lenght and width. The round hard protuberance or the one along the edges and depression in its centre, and a recurrent protrusion are regarded as being due to *vāta.* For their treatmnt,oleation, sudation, irrigation, anointing and oral adminstration of medicated ghee have been prescribed.[154] The treatment for the delay in the detachment of the umbilical cord, or its inflammation, ulceration or suppuration of the umbilical wound as well as an over growth of granulation tissue in the umbilical wound, has also been dealt with.[155]

(c) ***Ailments caused by milk vitation***: (i) Ailments due to the milk that has been vitiated by vāta and other doṣas: The milk vitiated by *vāta , pitta* and *kapha*, produces in a child

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gradual emaciation with flatulence and constipation; burning sensation; and heaviness and sleepiness respectively. The Ayurvedic texts recommend that the treatment for all these is to be given to the mother or wet-nurse as well as to the child; [156] (ii) *Bāla śoṣa*: As a result of excessive day-sleeping by the child and the consumption of cold water as well as breastmilk vitiated by *kapha,* the body channels of the child get obstructed by *kapha*. The child, after suffering from anorexia, fever, cough, etc., becomes scraggy with a glistening white face. A large number of appetizing and ababolic drugs have been mentioned as cures;[157] (iii) *Pārigarbhika*: The child which is in the stage of suckling milk of an immediately pregnant mother would suffer from cough, loss of digestive fire, vomiting, drowsiness, emaciation, anorexia, and giddiness, which arise because of negligence. Appetizers are its principal drugs, besides there are other recipes.[158] (iv) *Kṣīrālasaka*: Due to the consumption of milk vitiated by all the three *doṣas,* the child suffers from diarrhoea with foul smelling frothy stools, thirst, fever, vomiting,yawning, groaning, stomatitis and inflammation of the nose and eyes with impaired vision. The curative procedure is that, after producing emesis in the child and mother or wet nurse, specially prepared decoctions and powders are to be administered.[159] (v) *Other disorders*: Skin and eye ailments that develop due to the vitiated milk have been described under specific headings. (a) *Carmadala* (allergic dermatitis due to milk protein allergy): It has been stated that the milk vitiated by *vāta, pitta, kapha* or *sannipāta* will give rise to four types of allergic dermatitis in those children who consume such milk. The clinical features and methods, of treatment of this ailment have been dealt with in the texts.[160] In addition, other skin disorders like erysipelas, its clinical features and treatment as well as several types of hyperpigmentation of the skin, have also been dealt with and their treatments discribed.[161,162,163]. (b) *Eye disorders*: Besides the treatment of general disorders of the eyes of a child details of specific curative methods in respect of corneal opacity, ophthalmia neonatorum, or acute conjunctivitis and others can also be found in the Ayurvedic texts with appropriate terminology in Sanskrit[164]. (c) A disease known as *phakka* develops due to the consumption of milk vitiated by *kapha* (like *bāla śoṣa*) or due to diarrhoea, fever and other disorders. As a result, the health of the child constantly declines, and the child will not be able to walk independently even after one year of age. Apart from oral recipes and massage, physiotherapy and the use of a tripod have been recommended for curing this ailment.[165].

Several other diseases of children like napkin rash (*apipūtanā*), depression of bregma due to severe dehydration (*tālupāta* or *tālunamana*), acute palantine tonsillitis (*tālu-kaṇṭaka*), arthralgia (*parvānuplava*) pneumonia (*utphullikā*) and acute gastroenteritis (*coraka*) have also been dealt with in the Ayurvedic texts along with aetiopathogenesis and remedial measures.[166] Besides, a class of diseases under the name *bālagraha* (seizures) is believed to be due to supernatural evil influences. Though, there is divergent opinion or approach to this type of disease, among the texts, it would appear that such diseases include infective and related disorders.

The foregoing account, though brief, of the gynaecological and other aspects of the pregnant woman and lactating mother on the one hand, and, on the other, the care as well as the diseases that afflict the newborn and the curative methods, bears ample

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testimony, to the practices prevalent in ancient and medieval India. Realizing the importance of all these aspects, Ayurveda has dealt with them comprehensively under one of its eight branches, namely, *Kumārabhṛtya*. It may be emphasized that several practices specially, relating to paediatircs, are still in vogue in India. It is not infrequent find that Ayurvedic traditional methods are being adopted even in the modern medicinal milieu.

ABBREVIATIONS

(a) Texts

Aṣṭāṅga Hṛdaya	AH.
Aṣṭāṅga Saṃgraha	AS.
Bāla Tantram	BT.
Basavarajīyaṃ	Ba.R.
Bhaiṣajya Ratnāvalī	Bh.R.
Bhāva Prakāśa	Bh.P.
Bhela saṃhitā	BS.
Cakradatta	CD.
Caraka saṃhitā	CS.
Child health care in Ayurveda	CHC
Cikitsā Chandrodaya	Ci.Ca.
Cikitsā Kālikā	Ci.Ka.
Gada nigraha	GN.
Haramekhala	HM.
Harihara saṃhitā	Ha.Ha.S.
Hārīta saṃhitā	HS.
Kalyāṇa Kāraka	KK.
Kāśyapa saṃhitā	KS.
Kumāra Tantra of Rāvaṇa	KT.
Mādhava Nidāna	MN.
Megha Vinoda	Meg.V.
Navanītakaṃ	Nav.
Rājamārtāṇḍa	RM.
Śārṅgadhara saṃhitā	Śā.S.
Śubha Śānti Yogaprakāśa	ŚŚYP
Suśruta saṃhitā	SS.
Vaidya Kalpadruma	Vai.K.
Vaidya Manoramā	Vai.M.
Vaidya Rashasya	Vai.R.
Vaidya Vinoda	Vai.V.
Vaṅgasena or Baṅgasena saṃhitā	VS.
Vṛndamādhavaḥ	VM.
Yogaratnākara	YR

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Yogacandrikā	YC
Yogaratnasamuccaya	YRS.

(B) Sthāna

Cikitsā Sthāna	Ci.
Indriya Sthāna	In
Kalpa Sthāna	Ka.
Khila Sthāna	Khi.
Nidāna Sthāna	Ni.
Siddhi Sthāna	Si.
Sūtra Sthāna	Su.
Uttara Sthāna/tantra	U
Vimāna Sthāna	Vi.

(c) Khaṇḍa

Dvitīyā	Dvi.
Madhya	Madh.
Prathamā	Pra.
Pūrva	Pū.
Ṣaṣṭha	Ṣaṣ.
Tṛtīyā	Tṛ.
Uttara Khaṇḍa	UK.

(d) Commentators/Commentary

Adhamalla	Adha.
Aruṇadatta	Aruṇa.
Cakrapāṇi	Cakra.
Ḍaḷhaṇa	Ḍaḷhaṇa.
Madhukośa: Commentary of	Madhu.
Vijayarakṣita	Srikaṇṭhadatta

REFERENCES

(Note: In the numerical figures, the first one refers to the chapter number and the following numbers indicate the verse number)

1. *SS.Śū.* 1.8 (5); *Śū.* 3.35 to 37 with comm. of Ḍaḷhaṇa and Cakra.
2. *CS. Śā.* 8.34; *SS.Śū.* 1.8(1), *Śā.*10.8, *Ci.*14.15; *AS.Śā.*3.19.
3. *SS.Śā.* 2 . 47 to 49.
4. *SS. Śā.7,6; SS.Śū.35.12, 46.132, Śā.5.19-20.*

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5. *SS.Śā*.5.10,39,41; *Śā* 9.12; *AS.Śā*.5.90.91, *Śā*.6.34,*Ci*.13.32.
6. SS.*Śū*.35.12 with Ḍaḷhaṇa, *Śā*.5.10, *Śā*.6.7, 10,25,28; *AS.Śā*.7.12,13.
7. SS.*Śā*.5.43, *Ci*.7.36; *AS.Śā*.5.91,*Ci*.13.32; Ba.R.15; Bha. P.Pu.3.17 to 20.
8. SS.*Śū*.11.28, *Śā*.5.8,39 43, *Ci*.7.33,38 all with Ḍaḷhaṇa; *Ks.Śā*.3.6,7,9, *Khi* 9.16; *AS.Śā*.5.46;49; *AH.Śā*.3.11.
9. SS.*Śā*.6.7,9,25, *Śā*.7.22, *Śā*.9.5,7,12; *Ci* 7.36;*AS.Śā*.6.31, 32,*Śā*78,9,Si.13.32,Ci 13.32.
10. SS.*Śū*.14.18 Hs.Pra.5.13,14; Bha.P.Pu 5.281,282.
11. SS.*Śū*.14.6, *Śū*.35.13,*Śā*.3.11; *AS.Śā*1.4,21;*AH.Śā*.1,7,8 with Aruṇa, *Ks.Śā*.5.4.
12. *CS.Śū*.9.14, with Cakra, *Ci*.15.17 with Cakra, *Ci*.30.225,226; *SS.Śū*.14.6,7,12, with Cakra, *Śū*.15.5, *Śā*.2.17.SS.3,3, 10; *AS.Śā*. 17,10,20,43, *Śā*.5.98; *AH. Śā*.1.7,18,19, 23,24, *Śā*.3.81; *KS.Khi*.9.17; HS.*Śā*.S.1.8; Bs.*Śā*.5.6; M.N.61.6'*Śā.S.Pu*.5.16.
13. *CS.Śā*.8.5;SS.*Śā*.2.25 with Ḍaḷhaṇa; *AS.Śā*.1.44,45; *AH.Śā*.1.24 to 26;*KS.Śā*.5.7.
14. *SS.Śā*.2.31; *AS.Śā*.1.5;*AH.Śā*.1.27; Meg.V.11.PP.461.
15. *SS.Śā*.2.26;*AS.Śā*.1.46; *AH.Śā*.1.27; *KS.Śā*.5.7.
16. *CS.Śā*.4.7; SS.*Śū*.11.28,*Śā*.3.6 to 9 Ḍaḷhaṇa; *AS.Śū*.39.5; *Śā*.!.40 to 42; *AH.Śū*.30.4,6,*Śā*.1.21,22,27; *KS.Śā*.5.5,Si.4.7,Si 7.5; *HS.Śās*.1.9.
17. *CS.Ci* 2(4).40 to 42; *SS.Śū*.35.9, *Śā* 10.53; *AS.Śā*.1.34 with Indu; *AH.Śā*.1.8,9, with Aruṇa; *KS.Śā*.4.36, *Śā*15.4; *BS.Śā*.3.1.
18. *CS.Śā*.8.4,6 to 14;*SS.Śā*.2.27,28,46, *Śā*.10.54 to 56,*Ci* 24.89; *AS.Śā*.1.5, 53 to 56, 58,59,63,64; *AH.Śā*.1.9,20,21 with Aruṇa 28to 37; *KS.Śā*.5.3,7,9; *BS.Śū*.7.5to7; *BT*. 4,1,2,4,6 to 9; *SSYP*.3.34 to 38,40.
19. *CS.Śū*.25.40,*Śā*.2.25;SS.*Śā*.2.33; *AS.Śū*.13.3 *Śā* 1.68; *AH.Śā*.1.8,9.
20. *CS.Śā.2.12,Śā.8.5,18 with Cakra; SS.Śā.2.28,30,* Śā.3.5,12 with Ḍaḷhaṇa,
21. *CS. Śā. 8.19, Śā*.2.32 with Ḍaḷhaṇa; *Śā*.3.5 with Ḍaḷhaṇa;*AS.Śā.1.60, 61, 69* with Indu; *AH. Śā*.1.37 to 47 with Aruna; Bh.P.Ci.70.30 to 32.
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23. *CS.Śā*.4.27,*Śā*.6.23;*SS.Śā*.2.55, *Śā*.3.31 with Ḍaḷhaṇa,*AS.Śā*. 2.23 with Indu; *KS.Śū*28.6 to 8.
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25. *CS.Śā*.4.9 to 11, 20 to 22, 24; *SS.Śā*.3.18,30; *AS.Śā*.2.13, 22 to 24, 26 to 29.
26. *CS.Śā*.3.3, 5 to 7, 9 to 13, *Śā*.4.6, 12; *SS.Śā*.3.33, *Śā*.4.57 to 59, *Śā*.5.3 with Ḍaḷhaṇa; *AS.Śā*.5.4, 9to21,51.
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28. *CS.Śā*.4.14, *Śā*.6.21,22;*SS.Śā*.2.53, 54, *Śā*.3.32,*Śā*.4.26 to 31, *Śā*.5.45; *AS. Śā*.2.13 to 15, 31,34,65.
29. *CS.Śā*.2.12 to 14, 16; *SS.Śā*.2.37 with Ḍaḷhaṇa; *AS. Śā*.2.6; *KS.Śā*.6.59 to 61.
30. *CS.Śū*12.8, *Śū* 28.18,*Śā*.2.25, 29,30, *Śā*.3.17 with Cakra, *Śā*.4.30 with Cakra, *Śā*.8. 6,21; *SS. Śā*. 2. 25,31,35,47 to 52 with Ḍaḷhaṇa, *Śā*.3.17,19,20,25 to 25 to 27,36,*Śā*.10.9 with Ḍaḷhaṇa; HM.2.86.
31. *CS.Śā*.2.23 to 25, *Śā*.4.16, 20 to 23; *SS.Śā*.3.10, 16,15,34, *Śā*.4.24 *AS. Śā*.2.8,9,11,21,36,59; *KS.Śā*.2.6 to 8; VS.69.156.
32. *CS.Śā*.4.15,17,19; *SS.Śā*.3.18 to 28; *AS. Śā*.2.16 to 21.
33. *CS.Śā*. 4.18, *Śā*.8.20, 21; *SS.Śā*.3.16,*Śā*.10.2 to 3;*AS. Śā*.2.58,60 to 62, *SS*.3.3,14; *KS*.Ci.2.14,15, KLC.10.176,177;HM.4.295;RM.31.14. 34.*CS.Śā*.8.32; *SS.Śā*.10.14; *AS.Śā*.3.3 to 9, 11 to 13, KK.33.22 to 26;YR.*Śā*.21.91 to 96.
35. *KS*.Khi.10. ; Hs.Tr.51.1.
36. *CS.Śū*35.40, *Śā*.8.22;Si.2.12,21,Si.9.113,114;*SS.Śā*.10.67;
37. *SS*.U.49.4,12,25; *AS* Ni.5.38,39,Ci.8.13.
38. *CS.Śā*.8.32,*ASŚā*.3.9.10; BS.*Śā*.8.6.
39. *CS.Śā*.2.8 to 10; *SS.Śā*.10.57;*AS.Śā*.1.15 to 19;*KS*.Khi.9.36 to 40.
40. *CS.Śā*.2.15,Ci.38.95,96; *SS.Śū*15.12,16 with Ḍaḷhaṇa;Ni.8.3, *Śā*.10.57; HM.4.295; KK.12.60;Ci.289 to 294.

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41. *CS*.Ci.5 .5 to 7,18,19,169 to 182;*KS*.Khi., Nav.2.1-35 to 37, 2.2 -138 to 143; YC 16.36 to 44,50.
42. *CS*.*Śā*.2.16,*Śā*.4.29, *Śā*.8.24,Ci.28.34;*SS*.Ni.8.3,9,*Śā*.10.157; BS.*Śā*.3.14;HS.*Śās*1.24,25;*KS*.Ka.VI; Nav.3-48; Ha.Ha.S. 189 to 191.
43. *CS*.*Śū*18.6;Ci.14.9;*SS*.Ni.1.59, Ni8.3,*Śā*.10.57.
44. *CS*.*Śā*.8.20,23 to 25; *SS*.*Śā* 10.57 to 65;*KS*.Ka. 6.80; Nav.2.4-10 to 21,3.37 to 52, HM 2.25;BT.5; YR. pp.418,419.
45. *CS*.*Śā*.8.26,27;*SS*.*Śā*.10.57;*AS*.*Śā*.4.11 to 13,18 to 22;Meg.V.11.pp 476.
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47. *CS*.*Śā*.8.33 to 35;*SS*.*Śā*.10.5.
48. *CS*.*Śā*.4.24,25 with Cakra;*SS*.Ni.8.7,8;*Śā*.3.30,*Śā*.10.6,7; *AS*.*Śā*.2.35 with Indu;*KS*.Khi.11.6.
49. *CS*.*Śā*.8.36;*SS*.*Śā*.10.6,7; *KS*.*Śā*.5.21 to 23, 28,30,44 to 46.
50. *CS*.*Śā*.8.37 to 40; *SS*.*Śā*.10.8 to 10;*KS*.*Śā*.21 to 23, 28,30,44 to 46.
51. *CS*.*Śā*.4.25,29 with Cakra; *SS*.*Śā*.3.16, *Śā*.10.57 with Ḍaḷhaṇa,U38.32 with Dalh; AH.*Śā*.I.58,66 and *Śā*.2.18 to 21 both with Aruṇa; Hs.*ŚāS*1.24,25 MN. 64.2 with Madhu.
52. *CS*.*Śā*.8.30,31;*SS*.Ni.8.12 to 14 with Ḍaḷhaṇa;HS.Tr.52.16, KK 12.53; RM.31.32;
53. *CS*.Ci.28.34; *SS*.*Śā*.10.59;VM.65.12,14,18; HM 4.306 to 315; CD 63.13 to 27; GN.*ŚāS*4.18 to 27; VS.223 to243; BT.6.2 to 30;Vai.M.13.25;VaiR.Garbha Ci.6,Ci.ca. Part 5.pp.344 to 351.
54. *SS*.Ni.8.2 to 5 with Dalh,Ci.15.4 to 14 with Dalh; AM.*Śā*.2.29,30; YRS.21.150; HS.tr. 52.1 to 8; KK.12.48,Vai.M.13.28.
55. *SS*.*Śū*33.13 with Ḍaḷhaṇa; Ni.8.6,11 with Ḍaḷhaṇa, *KS*.Khi.10.168,169,174, MN.64.10 with Madhu;Ba.R.16.pp.253;*Śā*.SPu.7.81 with Adha.
56. *SS*.Ci.15.14;*AS*.*Śā*.4.33.
57. *SS*.Ci.15.5 to 9,*AS*.*Śā*.4.33, *KS*.Ka.6.80;Nav.2.1, 96 to101,2.3-59 to 64, 91 to 106; HS.Tr.52.11 to 13.
58. *SS*.*Śū*5.16,*Śū*25.11,12;Ci.15.3,9, 15th with Ḍaḷhaṇa;HS.Tr.52.15 to 17.
59. *SS*.Ci.15.3,9,10,12 to18,25 to 39,43,to 47;*KS*.Khi.10.172,173; YRS.21.227 TO 279.
60. *SS*.Mi.8.14 with Ḍaḷhaṇa;KK 12.52; VS.69.191.
61. *CS*.*Śā*.8.41;*SS*.*Śā*.10.18,21,Ci.15.17,18.
62. *AS*.*Śā*.3.36;*KS*.Ci.16.9 and 11; HM.4.316 to 318;VS.69.241, 242.
63. *SS*.*Śā*.10.16,*KS*.Khi.11.27,52 53.
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66. *CS*.*Śā*.8.47;*SS*.*Śā*.10.20; *AS*.U.11.16 to 19,26.
67. *CS*.*Śā*.8.49; *SS*.*Śā*.10.19,20;*AS*.*Śā*.3.40;AH.*Śā*.1.99,100.
68. *KS*.Ci.3.8 to 25;Khi 11.7 to 13.
69. *SS*.*Śā*.10.19; CK.344,345.
70. *SS*.Ni.9.20, 21;Ci.16.14.
71. *CS*.Ni.1.28; *SS*.U.39.8; *KS*.Khi.11.39 to 170.
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76. *CS*.Ci.30.7 to 41; *SS*.u.38.3 to 20; *AS*U.32.33 to 53;AHU.33.27 to 52 Vai.V. Strīroga, 17.
77. *CS*.Ci.30.41 to 43; 45 to 85,100 to 116, 121 to 125; Si.3.44,45; Si 9.62 to 65, Si.12.18 (1,2); Nav.3.1-9, CD.62.18.
78. *CS*.Ci.30.43 to 45 with Cakra; Vs.69.109
79. *SS*.Ni.2.17;Ci.6.2,*AS*U.38.10,U 39.5 to 8.
80. MN.63.1 to 4, VM.65.37;Bh.P.Ci.70.62,63.
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82. *KS*.Ka.6.31,32,34.
83. *SS.Śā*.2.4,5,12 to 16;BT.1.7 to 24.
84. *SS.Śū*15.12;*Śā* 2.21,22; Nav. 1.4-10 to21, 3.37 to 52; Cd.62.24,25, RM.31.8 to 10; Ba.R.15.Pp243;Bh.*R.Strīroga*. 219 to 225; Ha.Ha.*S.Strīroga*.93 to 133.
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87. *CS.Śā*.4.30.
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94. YRS.21.302 to 3.2.
95. *CS.Śā*.4.30;Ci 30.31 to 35; *KS.Śū*28.6.
96. HM. 2.34 to 46, 3.complete:CD.63.68,69; BT.3.54 to 56; 11.pp.487,488.
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99. *CS.Śā*.8.53;*SS.SA*.10.25;AS.U 1.20,38.
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102. *SS*.Ni.10.15 to 17,26,27,Ci.17.45 to 47; Ha.Ha.S.Strīroga.317 to 321.
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105. *CS.Śā*.8.54;*SS.Śū*45.57,58;*KS.Śū*19.26;HS.prath. 8.14; BT.2.13.
106. *CS.Śā*. 10.31; *AS*.U.1.25.
107. *SS.Śā*.1.25.
108. *CS.Śā*.8.57;*SS.Śū*15.12,*Śā*.10.30; *KS.Śū*19.10,11, 18 to 25, YRS.21.336,337,352 to 356; CD.63.42 to 52, YS.69.360 to 366;BT.12. 1 to9.
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112. *CS.Śā*.8.55, *SS*.Ni.10.23,24.
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115. *CS*.Vi.8.122;*SS.Śū*35.29;*AS.S*ū8.24,25;HS.Pra. 5.4.
116. *SS*.Śū 35.29; *KS*.Khi 3.72 to 74.
117. *CS.Śā*.8.42; *AS*.U.1.3,4.
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127. *AS*.U.1.40,52;*KS*.Khi.12.3 to 5.
128. *SS.Śā*.10.47;*AS*.U.1.41,42;*KS*.Khi 12.6 to 14.
129. *KS*.Khi.12.15;*AS*.U. 1.53 to 56;Vai.M.14.8.
130. *SS.Śā*.10.49;*AS*.U.1.43;*KS*.Khi.12.15 to 23.
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134. *CS*.Vi. 8.9 to 12; *SS.Śū* 2.3 to 5; *Śā*.10.52; *KS*.Vi.2.3,*AS*U. 1.6.
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141. *AS*.U. 1.58, U 2. 26 to 28; AH.U.1.41, 2.31 to 34; Nav. 2.14-30.
142. *KS.Sū*22.25; 27.66, Si.1.complete; Si. 3.5 to 15; Si 4.5, 11 to 13; Si. 8.7 to 12, Ka. 1. complete.
143. *ASŚā*. 2.54 to 65; AH. *Śā*.1.48.
144. *AS*.U.21.5,6; AH.U. IT.16,17; YRS.21.325 to 331.
145. *SS.Śū* 24.5; *AS.S*U. 22.3
146. *CS*. Ci. 282; *AS*.U. 2.27; Nav. 2.14 -36 to 39, YR. Bālaroga. PP 438,439.
147. *SS*. *Śā*. 10.49; *AS*.U. 2.32 to 96; *KS*. CI. 1.8 15. complete, Ka. 4.6 to 40; Na V. 2.14- 1 to 98; VM.66.4 TO 28; CD 64.23 TO 82; VS 70.22 TO 194.
148. *KS*. Ci. 11.4 to 21.
149. HM.4.350 to 360;BT. 14. complete
150. *A.S*U. 27.14; U. 28.27; AH.U.23.21, U.24.19, 20; VS. 70.129, 130.
151. AS.U. 2.91,92; CD. 64.3,4;VS.70.13.
152. *CS*. *Śā*. 8.45, *SS.Śā*.10.43; *AS*.U.2.89,90; BT.12.26.
153. *CS.Śā*. 8.44; *AS*.U. 2.85 to 88; VS. 70.19 to 21.
154. *CS*.Ci. 30.239 to 281; *AS*.U. 2.11 to 16; HS. Tr. 54.1 to 5; MN. 68.1 to 4.
155. *AS*.U. 2.46 to 52; AH.U. 2.44 to 57; VS. 70.133 to 135; GN. *Śā*.S 11.96 tp 108, YRS. 21. 471 to 482.
156. *AS*.U. 2.64 to 68; MN. 68.10, 11; GN. *ŚāS*11.127 to 131; VS.70.100 to 102.
157. *AS* U. 2.17, 18; AH.U.2.20 to 26; GN.11.18 to 23; YRS. 21. 38 to 407.
158. *KS*. Khi. 15. complete.
159. *KS*. Khi 14. 9 to 86.
160. *AS*.U. 2. 61; MN. 68.14,15; VS. 70.76 to 82.
161. *SS*. Ni. 13.14, Ci. 20.3,4; *AS*.U. 36.2, U.37.2; NaV.2.14-27, 28. *KS*. Ci.11.26 to 55; VS.70.13, 14 to 122; YRS. 21.500 to 549; HM. 4.348.
162. *SS*. U. 19.9 to 16; *AS*.U. 11.9, 23; U 12.8,14; *KS*.Khi 13. complete.
163. *KS*. Ci. 17. complete;
164. *AS*.U. 1.74, U 2.69 to 82, 96, D 64.7 to 10; Vai. M.14.5, 24, 25; Vai. Ka. *SAS* 4.7,71; Meg. V.Bāla.pp. 497 to 504; Vai R Bālaroga Ci. 22. to 24; YR.Bālaroga Ci.pp.444, 456, 457; Bh. R.Bālaroga 10 to 13; *SS*YP. 10.86 to 90.
165. *SS*. U. 27 to 37. complete chapters; *AS*.U. 3to 5.complete chap.AH.U. 3.complete,
166. *KS*. In 1.11 to 21; ci. 4.Complete, Ka. 6.42 to 56; HS Tr. 54.32 to 57; NaV. 2.14-27, 28; KT 1 to 67; BT. 7 to 11.complete; KK. 12.78, 80, 18.69 TO 115; YRS. 22. complete chapter.

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CHAPTER 8

Rasāyana and Vājīkaraṇa (Rejuvenation and Virilization)

Jayaprakash Narayan

The importance attached to a healthy body for achieving the pursuits of life stands prominent amongst the noted medical systems. The diligent care of the body, therefore, has been meaningfully highlighted in *Caraka saṃhitā*, perhaps the earliest codified text on Ayurveda. The primary goal has been the prolongation of life and living happily with a senile-free state. Towards this goal, there has been an incessant search for what, in the ancient and medieval periods, was known as the 'elixir of life'.

The desire for a long life is not a recent development. It will be evident for those who study Ayurveda that the search for methods which help to achieve this goal had been extensively and purposefully worked out by the ancient Indian sages leading to the concept and practice of *Rasāyana* for keeping up the human body with health and long life. Hence it was proclaimed by all the sages that maintenance of the body and its health are the forerunner to the achievement of *dharma,* because it is only after achieving success in prolonging life that it would be possible, with meditation, to achieve sound health and happiners.

AYURVEDA AND LONG LIFE

Ayurveda, which generally means the science or knowledge of life, is as relevant today as in yesteryears. The search for remedial measures is as old as the birth of the pathological state, which is as ancient as the origin of life. Such a symbiotic relationship between the life process, pathology, as deseribed in Ayurveda and remedy, has made it one of the most important systems of medicine.

The first chapter in the *Caraka saṃhitā* starts with the exposition on long life (*dīrgha jīvitiya*). In the introductory portion of this treatise, it has been stated that the sage Bhāradvāja who went to heaven to learn this knowledge achieved success in enjoying a healthy and long life and taught this knowledge (Ayurveda) to others on the earth. The

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purpose of bringing this knowledge from the divine beings to the earth was to overcome the problems that hinder the four pursuits or human values (*puruṣārthas*) as well as those of premature ageing, diseases and death.

NEED OF *RASĀYANA*

Among the four stages of human life, the youthful stage is the most attractive and with health, strength and endurance, one can achieve many laurels in one's life. But the fact is that though it is the most attractive stage of life, it has a short span and cannot be brought back at any cost. As age advances, the strength or ability to fight all odds including disease comes down drastically. One of the reasons for such a state is improper or imbalanced nutrition or intake of food. It needs no emphasis that he, who partakes of compatible food in the proper quantity, in time, and with control over his senses, will not suffer from diseases.

Besides, a person who is after worldly pleasures will fall prey to them and lose an important element from the body—śukra—the reproductive essence. The loss of this is said to lead ultimately to the end of life. In any case, its loss causes low immunity thus resulting in a state of fragile health prone to be afflicted with diseases.

In order to overcome this situation, the concept and application of a rejuvenating composition called *rasāyana* arose. It has been described that, by the use of *rasāyana* one will be free from premature senility, debility, disease and even death, thus one could lead a long healthy life. For this reason, *rasāyana* has been compared with the ambrosia of heavenly deities. It has been recorded that sages like Cyavana and others successfully overcame the effects of premature senility with the use of *rasāyana*.

BHEṢAJA—DRUG CLASSIFICATION

The word, *bheṣaja*, means that which conquers the fear of disease, which wards off the anxiety of disease or suffering. This term is also used as a synonym for treatment and has two objectives viz. to prevent the onset of disease or to cure it, which are the twin objectives of Ayurveda. *Bheṣaja* is therefore, classified into two parts : (i) that which promotes the health of an individual ; and (ii) that which is an antidote to disease. The former is further divided into *Rasāyana* and *Vajīkaraṇa*. Hence these types of drugs are called health-promotive ones.

Importance of Rasāyana and Vajīkaraṇa as health promoters

Rasāyana therapy acts on healthy individuals in such a way that it promotes strength in an individual. He will be prepared to fight the impending disease as well as build up the body elements and other principles that are responsible for the up-keep of health as well as bodily and mental functions, thereby achieving the goal of the prolongation of life. Thus the main objective of *Rasāyana* is to improve the body and its strength and enhance the life-span.

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The Benefits of Rasāyana

The benefits of *rasāyana* are to obtain a strong youthful body and to prolong the life span. Its aims are:

(a) Prolongation of life ;
(b) Boosting of memory and intelligence ;
(c) Modulating immunity against diseases ;
(d) Keeping up a youthful state ;
(e) Improvement in lustre of complexion and in voice;
(f) Optimization of strength of the body and sense organs;
(g) Enjoying honour in the society and body glow ;
(h) Infallibility of speech; and
(i) Attainment of robust health in general.

Benefits of Vajīkaraṇa

Vajīkaraṇa is meant for imparting a happy and successful marital life. Its aims are:

(a) Giving instantaneous enjoyment ;
(b) Having prolonged sexual act and giving satisfaction to the spouse;
(c) Imparting fertility to a man even in old age ;
(d) Providing multiple progeny ;
(e) Achieving a state of honour in the society ;
(f) Establishing a good lineage and fame ;
(g) Improving body strength; and
(h) Optimizing the nutritional status in general.

Definition of Rasāyana

In order to understand the specialty of *Rasāyana*, it is imperative to know its meaning: it is formed of two words—*rasa* and *ayana*.

The word, *rasa*, has different meanings in different contexts. In one of the contexts, *rasa* means the first of the seven body tissues (*dhātu*). It also means in another context the expressed juice of a fresh part of a plant, while in pharmacology, the taste of the given material is *rasa*. In the present context, the meaning may be attributed to the *rasadhātu*, the first of the seven *dhātus*, which is the product of nutrition or fluids resulting from food and drink after their proper metabolism. *Ayana* means movement, knowledge and accomplishment. Hence *rasāyana* connotes the circulation of *rasa* or that which is the foremost method to achieve an effective circulation of *rasa*. It is also defined as the accomplishment of the benefit of the well-developed *rasa* and the other *dhātus*. The other definition found in the Ayurvedic literature relates to the way of achieving long life (*dīrghāyu*) and boosting up the memory (*smṛti*). *Rasāyana tantra* or the branch of

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knowledge of *rasāyana* is, therefore, that which causes cessation of ageing, prolongation of life, improvement in memory, and bringing about a state capable of fighting a disease.

Types of Rasāyana

The Ayurvedic texts have described, in principle, two types of *rasāyana*: viz. (i) ***Kuṭī Praveśikā*** and (ii) ***Vātatāpikā.***

(i). Kuṭī praveśikā That which is undertaken in a specially built resort is called *Kuṭī-Praveśika Rasāyanā* method by which one undergoes the procedure by living in a specially built, three-chambered (concentric) house. By this method one would get every cell of his body rejuvenated, is said to be designed based on the early or first state of life in the mother's womb.

There is another sub-type of this called *Droṇī Praveśikā Rasāyana* in which a person stays in a boat (bed) made of ***Palāśa*** (*Butea monosperma*) and consumes only milk diet. This is said to renew the person and impart strength to him as well.

(ii) Vātatāpikā **:** This is intended for a person who finds it impossible to undergo the first method, for reasons of endurance, or ability to pay, or to spend a long time in this treatment. In this method, one is exposed to the sun and wind during *rasāyana* therapy. The advantage is that this method allows visits from friends and relatives and one can attend to one's every day routine during treatment and is free from the strict rules of the former method. The most effective method, however, is *kuṭī praveśikā*, although it is a difficult procedure.

There are also some other methods of *rasāyana*. Since life is the combination of diverse elements such as the mind, soul, and body, there is a need for a diversified but comprehensive approach to *rasāyana*, as it is not possible through only by one method or drug.

Rasāyana drugs

There are mainly three types of rejuvenating drugs: ***(a) Kāmya Rasāyana***; ***(b) Naimittika Rasāyana***; and ***(c) Ajaṣrika Rasāyana.***

(a) ***Kāmya rasāyana*** : With the 'desire' (*kāma*) of the rejuvenating body, preservation of health, improvement in intelligence and protection from disease through boosting of immunity, the procedure of *rasāyana* undertaken is called *kamya rasāyana* which is of eight sub-types:

(a) *Sarvopaghāta samanīya rasāyana*—These are drugs which impart generalized immune strength to the body to fight diseases.

(b) *Svābhāvika vyādhi pratiṣedhanīya rasāyana*—Those that stabilise an individual to endure natural afflictions like senility, hunger, thirst, sleep and death (premature).

(c) *Nivṛtta santāpīya rasāyana*—Those which relieve all kinds of bodily exhaustion.

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(d) *Prāṇakamīya rasāyana*—Those which by stabilising the bodily strength and immunity will maintain life.

(e) *Medhāyuṣkara rasāyana*—Those which improve the strength of higher mental functions such as intelligence and memory.

(f) *Kṣīṇabalīya rasāyana*—Those which boost the strength (muscular or motor functions) of the body.

(g) *Vṛṣya rasāyaṇa*—Those which promote generative vigour.

(h) *Vājīkarana rasāyana*—Those which improve the quality and quantity of reproductive elements and make an individual able to have children.

The first four types relate to one class of drugs, while *medhāyuṣkara* ones are effected by a class of *medhya rasāyana* drugs and the last three types are brought about by *vajīkara* drugs. (Table 3)

Table 3

Medhya rasāyana ingredients include the following

1. *Gudūcī*	(*Tinospora cordifolia*)
2. *Vaca*	(*Acorus calamus*)
3. *Maṇḍūkaparṇī*	(*Centella asiatica*)
4. *Brāhmī*	(*Bacopa monniera*)
5. *Yaṣhtimadhu*	(*Glycyrrhiza glabra*)
6. *Śankhapuṣpī*	(*Convolvulus pluricaulis*)
7. *Nīlotpala*	(*Nymphaea lotus*)
8. *Ghṛta, Kṣīra*	(*ghee, milk*)

(b) Naimittika rasāyana : Such methods as are instrumental in alleviating the disorders are called *naimittika rasāyana*. These include single drugs and polyformulations which antagonise a specific disease. (Table 4)

Table 4

Drug		*Curative effects*
1. *Gambhāriphala*	—	Fruits of *Gmelina arborea*—***raktapitta***
2. *Khadira*	—	Heartwood of *Acacia catechu*—***kuṣṭha***
3. *Bakuchī*	—	Seeds of ' *Psoralia corilifolia*—***svitra***
4. *Brāhmi*	—	whole plant of *Bacopa monneri*—***apasmāra, unmada***
5. *Hārītaki*	—	Fruits of *Terminalia chebula*—***gulma, arṣas***
6. *Pippalī*	—	Fruits of *Piper longum*—***kāsa, śvasa***
7. *Śilājatu*	—	Bitumen—***tridoṣaghna***
8. *Bhallātaka*	—	Fruits of Semecarpus anacardium,—***kaphaghn—agnivardhaka***
9. *Cyavanaprāśa*	—	Formulation—***śvāsa, kṣaya, hṛdroga***
10. *Musta*	—	Rhizomes of Cyperus *rotundus* (***jvarātisāra***).

(c) Ajaśrika rasāyana : Those substances by the perpetual use of which the bodily elements are kept in homeostasis are called *ajaśrika rasāyana*. For example, the use of milk, honey, ghee either individually or in combination every day brings about this type of *rasāyana* effect.

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Ācāra rasāyana : This is a kind of behavioural therapy that has all the benefits of *rasāyana* therapy. Caraka has stated that one who, by observing all the behaviours described under *ācāra rasāyana*, partakes of *rasāyana* drugs, will get the full benefit of *rasāyana* treatment. Mere *rasāyana* therapy alone will not be able to bring out the full benefit.

In order to achieve the *svasthavṛtta*—the art of healthy living in totality—the earlier authors of Ayurveda have codified certain norms of living with good behaviour, based on some religious texts. Observing all these Vāgbhaṭa has described the features of a healthy person. It is said that one who consumes everyday compatible foods and keeps good habits, who is analytical, free from excessive desires, is given to charity, truthfulness, has forbearance and serves the old and the needy, will be free from diseases. In other words, the *rasāyana* therapy should be engendered by right mental attitude and conduct.

Age for Rasāyana Treatment

The life of a human being is classified into three stages: (i) childhood; (ii) middle age; and (iii) old age. Childhood is further subdivided into three, viz. the age of milk-diet, (which is up to one year from birth), that of milk and rice (which is up to two years), and the age of rice diet (two to sixteen years).

Middle age is divided into four stages:(i) growing;(ii) youthfulness; (iii) fully grown; and (iv) decline. The growing stage is between sixteen and twenty years, while the period of twenty and thirty years of age is called youthfulness, and between thirty and forty years is known as the fully grown stage, i.e. optimum growth of tissues, strength, complexion and proper function of the senses. The period from forty up to seventy years of one's age is identified as a stage of decline one wherein all the factors and principles start degenerating.

The period of life after seventy years is the stage of old age when the degeneration of tissues occurs, and functioning of the senses, bodily strength and mental ability would be decreasing day by day. It is also the stage of the manifestation of senility.

The Ayurvedic texts have described the stage of administration of *rasāyana* drugs and therapy. Though Caraka is silent about it, Suśruta and Vāgbhaṭa have dealt with the first two stages, i.e. childhood and middle age, as suitable for *rasāyana* procedures. This is because of the optimum uptake of *rasāyana* benefits that will, in turn, check, delay or postpone the ageing process, which would thus be optimum at the stage of old age. The best age for *rasāyana* is the middle age, because the shift of growth to the beginning of degeneration needs a procedure, which slows down the ageing process, although it is required all through life, as metabolism is an uninterrupted process in the body.

Seasons and Rasāyana

Ayurveda has prescribed a suitable time and season to begin any activity, with a view to achieving the utmost benefit in tune with the necessary accommodation and adjustment

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with seasonal variations since seasons have an influence on the body. Generally, for the *rasāyana* procedures *śarad* (autumn), *vasanta* (spring) and *prāvṛīṭ* (pre-rainy) seasons are the best. The other seasons are regarded as undesirable because their influence over the body will be unsuitable for achieving the positive benefits of *rasāyana*. In addition, the best season/time for *rasāyana* will be when there is no excess of cold, or heat, or rain.

Rasāyana procedure

Preparative: *Before* taking up the main operations, a suitable place is to be determined and equipment kept ready. In this regard the building up of a ward or *kuṭī* is of utmost importance. The *kuṭī* has its own specialities.

Construction of kuṭī: The original source of information regarding the construction of a kuṭī (cottage) or śālā (general ward) is traceable to the Vedas. According to the Ayurvedic texts, a kuṭī is to be built on an auspicious day when there is proper conjunction of the stars and in a place free from all troubles. The essential articles to be collected are the drugs, water, utensils and other items. An expert in the field should undertake the construction of the kuṭī. Its location should be free from obstruction by other high-rise buildings, protected from dust, solar heat, and rain as well as sound. It should be built on land free from fear of attacks, or owned as a place of residence of the king/administrator, physician or wise men. The place should have access to various articles to be used in the procedure, and it should lie towards the northern or eastern part of a city or town. The building should be spacious, having three concentric chambers, with small windows, thick walls and compatible to all seasons. It should be well ventilated and have a good amount of light, and be pleasing to the mind. It should also be well-equipped with nursing staff, drugs, physician, kitchen, beds and other accessories

Qualities of a physician: A physician who is employed for the kuṭī should have clarity of mind, knowledge of science, extensive clinical experience, bodily and mental cleanliness, and dexterity. He should display good conduct, be free from ego and irritation, tolerant and have the attitude to regard patients as his own kith and kin. The nurse/therapist should have a good background, clean habits gentle behaviour, kindness towards patients, and be skilled, obedient with a knowledge of the performing arts, Vedas and other spiritual texts.

Collection of drugs: *The* kuṭī *should have enough stock of* Harītakī *(*Terminalia chebula*),* Āmalakī (*Emblica officinalis*), daśamūla (*ten herbs*), aṣṭavarga (*eight herbs*), Punarnava (*Boerhaavia diffusa*), Balā (*Sida cordifolia*), Eraṇḍa (*Ricinus communis*), Śatāvarī (*Asparagus racemosus*), pippalī (*Piper longum*), Śaṅkhapuṣpī (*Convolvulus pluricaulis*), Yaṣṭimadhu (*Glycyrrhiza glabra*), Brāhmī (*Bacopa monniera*), Gudūcī (*Tinospora cordifolia*), Śuṇṭhi (*Zingiber officinalis*); *and medicinal preparations from metals like gold, silver, copper, iron* bhasma *as well as gems, honey, ghee and rock salt.*

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For *Vājīkaraṇa,* the stores should have the collection of Rasna (*Alpinia galanga*), *Aśvagandha* (*Withania somnifera*) *Kharjūra* (dates), *māṣa* (black gram), chicken meat, eggs, wheat, sesame seeds, sugar, etc.

The Ayurvedic texts have emphasized that the drugs for the purpose of *rasāyana* and *vājīkaraṇa*, and for *samśodhana* (purificatory procedure) should be collected from the Himalaya mountain range. The reason is that the drugs thus collected from there will be rich in constituents and of the best quality. The plants should be collected during the proper seasons, when fully mature, free from the ill-effects of water, wind, sun, microbial contamination, diseases and unmutilated. If it is not possible to get them from the Himalaya mountains, they can be collected from a well-known and suitable habitat.

***Selection of Individuals*:** After the collection of drugs, staff etc., the physician should select individuals to undergo this therapy. This is of utmost importance for the successful completion of the therapy, and to get all the benefits of *rasāyana*.

While selecting an individual, the following should be considered: he should be truthful, free from negative emotions, does not get irritated over small matters, free from vices, not wicked, peaceful, soft spoken, magnanimous, ascetic, nature-loving, cognizant of place, time, and seasons. The success of the procedure lies in the selection of individuals for the *rasāyana* therapy.

In any case, the following persons should be avoided for undertaking *rasāyana* treatments: one who has (a) instability of mind and senses, (b) has inability to undertake essential instructions in time, (c) is unable to pay for the treatment as well as to procure materials, (d) is negligent in following the treatment seriously, (e) is unable to follow strict instructions, (f) is sinful and (g) is disrespectful to the medicines and the treatment.

The selected person has to stay in the *kuṭī* all alone, without having any contact with the family or women, and he should be free from all other worldly affairs such as business, commerce, and profession. As he has to stay for a length of time, he should not develop any feeling of isolation, but should cultivate a strong will and keep a good memory. He should be mentally prepared and have immense faith in the therapy. Before entering the *kuṭī*, he has to shave his beard, cut his hair and trim finger nails.

***Entry to kuṭī* :** During the *Uttarāyaṇa* or the first half of the lunar year, on a day during the bright fortnight of a lunar month as well as on a day which has the star of *Puṣya, Hasta, Jyeṣṭha, Rohiṇī, Śravaṇa, Aśvinī* or *Svāti,* the individual has to make an entry into the *kuṭī*. On that day, the person has to worship a cow, a god and a Brahmin, and circumambulate (go around them in a clockwise direction) with a pleasant mind, and then enter the *kuṭī*. This performance is said to bring about the balance of mind and a positive attitude which will enable him to have the benefits of therapy. It is only thereafter that the therapy of *rasāyana* has to start with the process of purification (*śodhana - pañcakarma*).

In order to prepare the body to assimilate the benefits of *rasāyana*, to eliminate certain toxic elements present in the body and to open up and clean the channels or bio-pathways, one has to undertake a purification or *śodhana* procedure, for, the benefit of

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rasāyana will not accrue to a body if it is not cleansed of its metabolic wastes and morbid substances. The procedure for purification involves the bringing out of morbid matter from the systemic circulation, into the gastro intestinal tract from where it is eliminated.

Rasāyana karma

Pre-operative: This procedure involves subjecting an individual to *śodhana* which should be carried out with *pañcakarma*—the five-fold procedure—prior to which the person is subjected to *snehana* (oleation) and *svedana* (sudation). During *snehana*, he is given ghee or sesame oil internally and medicated oils are applied externally. Then he is subjected to sudation or steaming all over the body except the head and face. Thereafter the actual *pañcakarma* methods are applied-*vamana* (emesis), *virecana* (purgation), *ānuvāsana basti* (fat enema), *āsthāpana basti* (decoction enema) and *nasya* (nasal medication) in that order.

Operative: This is the main procedure in which the person, after undergoing purification both internally and externally, will be given specific *rasāyana* medication and observed for a specific length of time along with dietetic follow-up and management of any eventualities.

The Ayurvedic texts have recorded several such *rasāyana* drugs either singly or in combination. Some of them are:

(i) Viḍaṅga taṇḍula prayoga : One *drona* of (about 12kg.) of the seeds of the *Viḍaṇga* (*Embelia ribes*) are taken and tied in a cloth. It is suspended in a vessel containing water and heated for three hours. The decoction of the seeds thus obtained is mixed with an equal quantity of honey and taken in an iron vessel, sealed and kept buried in the heap of ash for four months beginning with the pre-rainy season (*prāvṛṭ*) and taken out after the rainy season. This liquid is to be administered to an individual who has undergone purification with all the Vedic rites and in a dose suitable to his strength.

After the medicine is digested, the following diet is to be given to him. A soup of green gram with gooseberry (*Emblica officinalis*) ghee, and cooked rice. For regular massage, *anu taila* is to be used and for drinking, a special preparation called vetiver water is used. The period of this treatment is 6 months. In the first trimester the elimination of intestinal helminth and other parasites is to be achieved. In the second trimester the healthy growth of hair, nails, and teeth culminate, with improvement in the bodily strength and complexion.

(ii) Balā mūla kalka prayoga (root of Sida cordifolia) : A paste of the root of this plant is administered in the dose of 24-48 gm along with cow's milk, once a day in the morning and for diet, ghee and milk rice are taken after the medicine is digested. This administration is to be done for 12 to 100 days, which will bring about a long, healthy life. Further *Śatāvari cūrṇa* (powder of *Asparagus racemosus* rhizomes), *vārāhī kāṇḍa cūrṇa* (powder of *Dioscorea bulbifera* tubes), and *Āmalaki svarasa* (juice of *Emblica*

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officinalis fruits) could be taken as per the earlier description and for the period similar to *Bāla mūla kalka prayoga*, which will bring immense benefit to the concerned person.

(iii) Maṇḍūkaparṇī-svarasa (juice of *Centella asiatica* leaves) can also be given with milk for three months, with a diet of ghee, rice and milk.

(iv) Brāhmī-svarasa (juice of *Bacopa monnera* leaves) could be administered (in a dose according to the individual's body strength) for 21 days. At the end of this period, the person will get the benefits such as improvement of intelligence in the first week, power of memory and recollection by the end of the second week, and increased retention of memory in the third week.

Poly formulations

(i) Brahma Rasāyana: *Hārītakī* (1000 numbers) and *āmalakī* (3000 fruits) are cooked in the decoction of five types each of *pañcamūla* (in all 25 herbs). The fruits, after removing their seeds, are made into a paste and mixed with the powders of 14 special herbs (*Tvak, Elā, Musta, Rajania, Pippalī, Agaru, Śveta Candana, Maṇḍūkaparṇī, Nagakeśara, Śankapuṣpi, Vacā, Nāgara Musta, Madhuyaṣṭi and Viḍaṅga*) and added to the decoction along with sugar candy. To the syrup thus prepared sesame oil and cow's ghee are added. It has been recorded that, with the administration of this preparation, the sages were free from the effects of old age and lived for a long time. This preparation is intended to enhance intelligence, memory and strength. The dosage is as per individual's digestive capacity, followed by strict milk rice diet.

(ii) Cyavanaprāśa : 500 fruits of *Āmalakī* are cooked in a decoction of three chosen herbs and the pulp is to be fried with ghee. A decoction is made into a syrup with sugarcandy and the fried pulp is along with powders of six special herbs are added, mixed with sesame oil and stored. The dosage, which is as per individual's strength, is followed by a diet of milk rice. By using this preparation, sage Cyavana was stated to have been endowed with youth and was free from all troubles; hence his name is associated with this *Rasāyana*.

(iii) Āmalaka rasāyana : (i) *Āmalakī-harītaki; (ii) Āmalakī-vibhītakī;* (iii) *Hārītakī - Vibhītakī; (iv) Āmalakī, Hārītakī;* and *Vibhītaki.* Any one of the above combinations is taken and the fruits are covered with the fresh bark of *palāśa* (*Butea monosperma*) and smeared with mud and dried. This is baked over fire. Then the fruits devoid of seed are ground well and administered along with curds, ghee, honey, sesame oil and sugar. The recommended diet is cooked rice soup, ghee and milk. This *rasāyana* brings good health, long life and increases the strength of senses.

(iv) Āmalaka ghṛta : This consists of the juice of *āmalakī* fruits and the roots of *punarnava* (*Boerhaavia diffusa*) cooked with ghee for 100 times. The product is then processed with the juice of the tubers of *Vidāri* (*Pueraria tuberose*) and leaves of *jīvantī*

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(*Leptadenia reticulata*) for 100 times and then cooked with milk, roots of *Balā* (*Sida sp.*), *Atibalā* (*Abutilon indicum*) and *Śatāvarī* for another 100 times. The medicated ghee thus obtained is mixed with a quarter (by weight) of sugar and honey, and stored in a gold, silver, or earthen vessel. The dosage should be according to the individual's capacity for digestion followed by a milk-rice diet. With the administration of this one would live for a long time and one's body would be very strong with perfect senses and good complexion.

(v) Medhya rasāyana : This rejuvenating composition consists of the juice of *Maṇḍūkaparṇi* (leaves of *Centella asiatica*), powder of *Yaṣṭimadhu* (roots of *Glycyrrhiza glabra*), juice of *Guḍūcī* (*Tinospora cordifolia*), and the paste of *Śankhapuṣpi* (*Convolvulus pluricaulis*). This is administered with milk and rice with ghee as the diet. This would strengthen intelligence, improve complexion and sweetness of voice and result in higher mental functions.

(vi) Vardhamāna pippalī rasāyana : This *rasāyana* relates to the consumption each day of 10 fruits of *pippalī* (*Piper longum*) crushed in milk and by increasing 10 fruits every day up to a total of 100 fruits per day (i.e. 10th day). From the 11th day onwards 10 fruits have to be reduced every day till only 10 fruits are consumed on the 19th day. This makes in all 1000 fruits in 19 days. The quantity of milk is also to be increased sufficiently. This *rasāyana* keeps away all the diseases like respiratory troubles, digestive disorders, liver and other diseases.

The foregoing are among the most important *rasāyana* preparations used in *kuṭīpraveśika* methods. The Ayurvedic texts have given details of many more combinations and the readers are referred to the classical literature on Ayurveda such as *Aṣṭāṅgahṛdaya, Aṣṭāṅgasaṃgraha, Bhāvaprakāśa, Yogaratnākara, Cakradatta, Gadanigraha, Bhaiṣajya-ratnavālī* and others.

The preparations, which are administered for *Vajīkaraṇa,* could also be used in the *Kuṭīpraveṣikāvidhi* (methods).

Post-operative observations : These include the plan of diet and other habits to be followed after the consumption of *rasāyana* drugs. One has to stay in the innermost chamber of the *kuṭī* for 10 days from the day of the withdrawal of *rasāyana* administration. But one can move into and sit in the second outer chamber quite often. During the next 10 days, one can also sleep in the second outer chamber and start moving out to the third outer chamber frequently. During the last 10 days, one can sleep in the outer chamber and can come out of the *Kuṭī* periodically. In this way, in one month, one should come out of the *kuṭī* on a day of the bright fortnight and with the chanting of holy *mantras* and worshipping master physicians as well as a cow and circumambulating them; one can get discharged from the *kuṭī* and go home.

Diet: For two to three days after coming out of the *kuṭī*, one should partake rice, milk, ghee and wheat products. Among fruits, pomegranate, grapes and almond are allowed under the physician's guidance. Hot, heavy to digest, stimulant foods and drinks are to be strictly avoided.

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***Habits*:** The person should not expose himself to excessive wind and sun suddenly. Slowly he should expose himself in the early morning and evening environments and later to the normal ones.

***Behaviour*:** Observing strictly certain rules of conduct will enhance to a great extent the benefits of *rasāyana* therapy. One should avoid emotional stress, be truthful, abstain from alcohol and sex, have control of the mind and the senses, be pious and religious, show respect to elders and fellowmen, follow proper rules for sleeping and awakening . Keeping free from egoism and atheism; he should be philosophical in outlook, observing the code of conduct prescribed by the scriptures.

***Abhyaṅga and bath*:** Application of specially medicated oils like *Bala taila* and *Yaṣhṭimadhu taila,* and taking a massage periodically and bathing in tepid water with fragrant herbs would be extremely beneficial. These post-therapeutic measures have to be followed for at least 2 to 4 months.

***Vātatāpika rasāyana*:** This rejuvenating type is applicable in the case of those who do not have time and money to undergo the *Kuṭīpraveśikā* method. This is a simpler method and does not affect the daily routine of life. By attending to one's normal activities, one should partake of this *rasāyana* preparation also with due consideration to proper diet, habits and behaviour. The use of *triphalā* (fruits of *Terminalia chebula*, T. *bellerica* and *Emblica officinalis*), *śilājatu rasāyana,* etc., are considered beneficial along with other prescribed formulations.

***Ācāra rasāyana*:** The Ayurvedic texts have rightly pointed out that excellent character and good behaviour (*ācāra*) themselves would act as the best rejuvenator of the mind and its functions. All the benefits of *rasāyana* can thus be derived without taking any medicine. A person who wishes to undertake this *rasāyana* should: speak truth; be free from anger; abstain from alcohol and observe celibacy; avoid overstrain; always remain calm and composed; speak good about others; be devoted to penance and holy scriptures; maintain cleanliness; understand and appreciate others' viewpoints; take delight in helping others; be diligent in spiritual endeavours; foster a prayerful mood towards priests, teachers and elders; be compassionate, moderate and observe non-violence; be regular in sleep and work; take milk and ghee regularly; be conversant with the science of medicine and dosage; be devoid of egoism; possess an exalted moral character; be attached to persons who believe in religion, and have self-control.

***Nitya rasāyana* :** External rasāyana involves truthfulness, not getting either easily provoked or emotionally disturbed, meditation, calm and quiet in nature and adhering to the rules of good conduct—these act as a tonic and should always be practised.

***Paripurṇa or rasāyana*:** Involves scientific discussions, keeping company with intelligent people, and having a clear concept of ones own subject.

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These *rasāyanas* and procedures have been laid down by Ayurveda for prolonging life, retaining youthful vigour in old age and preventing disease. But they prove effective only in persons who have purity of mind and body as well as having complete self-control.

VĀJĪKARAṆA

Among the drugs and measures which are meant for the promotion and protection of healthy individuals, *Vajīkaraṇa* or the *Vṛṣya* class is one. If the *rasāyana* is meant for promoting physical strength, health, and span of life as well as imparting immunity, *vājīkaraṇa*, in addition, also participates in all these aspects and produces special benefits of a healthy and happy marital life.

For wealthier persons who want to improve their complexion and beauty, and wish to enjoy marital happiness, as well as for the aged ones who want to improve their fecundity, *vājīkaraṇa* is recommended in terms of *vṛṣya* treatment. Continuity of the human race has also religious importance, which is projected as the need to propitiate the forefathers, and it is in this direction that the concept of *vājīkaraṇa* has assumed significance.

Caraka's version of the benefit of *vājīkaraṇa* is that of a 'Progeny Promoter' (*apatyasantanākaram*) which means that which will not let forefathers fall from heaven. Irrespective of this belief, it is of utmost importance because, in order to preserve the gene of *Homo sapiens,* one has to be fertile and procreate. To realize this goal, the *vājīkaraṇa* treatment is especially beneficial.

In the *Caraka saṃhitā*, *Vājīkaraṇa,* is defined as that by which (through food, drugs, and behaviour), a man can have the capacity to cohabit like a horse *(vājī)* and by the comsumption of which he can uninterruptedly copulate. Such medicines and therapies are, therefore, an integral part of *vājīkaraṇa*, leading to quick enjoyment, satisfaction of both partners, quality of progeny, honour in the society, besides building up of ones own strength and nutrition. With this treatment, besides the above benefits, *vājīkaraṇa* offers a beacon of hope for those who, as a result of the influence of stress and other forms of pressure in life, have low fertility parameters.

It is said that an individual should have *vājīkaraṇa* preparations after *rasāyana* therapy regularly, because righteousness (*dharma*), wealth (*artha*), pleasure and fame (*yaśa*) are all under the influence of this therapy by which one not only begets a child but also achieves these. Such articles (food and drink), which are sweet in taste, rich in fat and nutrients, prolong the life-span, strengthen the body structure and are weight, and are pleasant for the mind, are considered to be *vājīkaraṇa* substances.

Benefits of Vajīkaraṇa drugs

The *rasāyana*, which increases the quality of the sexual or reproductive organs, is termed *vṛṣya* or *vājīkara rasāyana*. The word, '*vājī*', as noted before, means a horse and *vṛṣa* means a bullock. Both the horse and the bullock have prominent reproductive organs and

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are associated with powerful sexual vigour. Hence the above nomenclatures are used. The benefits of the *vājīkaraṇa* drugs are: they increase sexual desire, performance and fertility, promote spermato-genesis, and improve the quality of the sperm and ovum and improve the appearance of a person so that he or she becomes more attractive to the person of the opposite sex. Improving the quality of sperms and ova is the most effective means for ensuing healthy progeny. It may be possible to prevent congenital anomalies by the administration of *vājīkaraṇa* drugs.

There are four types of *vājīkaraṇa* drugs: *(a) śukra janana; (b) śukra pravartaka; (c) śukraśruti vṛddhikara; and (d) śukra stambhana*

***Śukra janana*:** Those substances which nourish the *sukradhātu* after supplementing the preceding six *dhātus* like *rasa*, *rakta*, etc. are called *śukrajanana*. They constitute *apmāhbhūta,* (water element) slimy and sweet with cold properties. They are employed in cases of a diminished *śukra* state. An example of this kind of drug is *Jīvaka*. Some mention the semen of the crocodile as the best promoter of *śukra.*

***Śukra pravartaka*:** Those, which stimulate the ejaculation of *śukra,* are called *śukra pravartaka* drugs. They are of three kinds: (i) those which stimulate the centre in the spinal cord which in turn stimulate the external genitalia. e.g. *Viṣamuṣṭi* (*Strychnos nux-vomica*); (ii) those which work through the psycho-neuro-endocrine system, like the presence of a beautiful woman, her charm, touch and voice; and (iii) those which stimulate organs in the genito-urinary system, especially the prostate gland; e.g., *makṣika* (honey).

***Śukraśruti vṛddhikara*:** That which acts as both *śukra janana* and *Śukra pravartaka* is called *śukraśruti vṛddhikara* e.g. meat, milk, *bhallātaka* (*Semecarpus anacardium*).

***Śukra stambhana*:** The drug that stops ejaculation is called *Śukra stambhana*; e.g.: *Jātiphala* (*Myristica fragrans*), and *ahiphena* (*Opium*), Some of the herbs having *vṛṣya* activity are: *Kṣīra Kakoki*; *Śatāvarī* (*Asparagus racemosus*); *Madhūka* (*Madhuka indica*); *Mṛdvīka* (*Vitis vinifera*); *Ātmagupta* (*Mucuna pruriens*); *Jīvaka* (*Microstylis muscifera*); *Ṛiṣabhaka* (*Microstylis wallichii*); *Meda* (*Polysonatum cirrihifolium*); *Jīvantī* (*Leptadenia reticulata*); *Yaṣṭimadhu* (*Glycyrrhiza glabra*); *Vidāri Kāṇḍa* (*Pueraria tuberose*); *Aśvagandha* (*Withania somnifera*); *Kokilakśa* (*Asteracantha longifolia*); *Musalī* (*Curculigo orchioides*)

Amongst the food articles having *vṛṣya* are: *ghṛta* (cow's ghee); *dugdha* (cow's milk); *Māṣa* (blackgram); meat of *kukkuṭa* (cock), *mayūra* (peacock), *mahiṣa* (buffalo); *varāha* (pig); *rohita matsya* (a type of fish); *tittira* (sparrow); *śaśti taṇḍula* (broken red rice); *godhūma* (wheat); *śaṛkara* (sugar); *kharjūra* (dates), and *ikṣurasa* (sugar cane juice).

Vṛṣya rasāyanas

(i) Cow's milk boiled with *vidārikāṇḍa, ātmagupta* seeds and *priyāla*;
(ii) Cow's milk boiled with black gram and *kamalinī* and taken with honey and ghee;
(iii) Onion juice taken along with ghee, honey, milk and sugar;

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(iv) *Āmalakī* powder medicated with *Āmalakī* juice to be licked with ghee, and honey and followed by a cup of milk;
(v) Half a teaspoon of *yaṣṭi* powder with *ghee* and honey followed by cow's milk;
(vi) *Rava* kheer boiled with *ātmagupta* seeds, and *māṣa* (blackgram) and taken with ghee, honey and milk;
(Vii) *Kokilākṣa* and *ātmagupta* seed powder with milk and sugar;
(viii) Milk boiled with *Gokṣura,* sugarcane *Ātmagupta, Kokilakṣa* and *Śatāvarī;*
(ix) *Śatāvarī* powder with black gram and sesame paste for women;
(x) *Aśvangandha* powder boiled in cow's milk in the ratio of 1:2;
(xi) 10 tablespoons of black gram flour boiled in milk and with ghee honey and sugar;
(xii) Unpolished rice with cream of curds and sugar;
(xiii) Puri made of the flours of wheat, *Vidāri, ātmagupta, ghee* and honey;
(xiv) Puri made of flours of rice, wheat, barley and blackgram medicated with *pippalī* and fried in ghee;
(xv) In cases of sterility, ghee medicated with a decoction of *Brāhmi, Dūrvā, Āmalakī, Lakṣmaṇa. Guḍūci, Kadalī, Hārītakī, Kaṭuki and Priyaṅgu* taken orally;
(xvi) Cow's milk boiled with testes of goat or sheep;
(xvii) *Pāyasānna* prepared by boiling rice in milk together with an egg of the sparrow;
(xviii) The female should take *phalaghṛta*-3-6 teaspoons twice daily for 16 weeks;
(xix) *Śatāvarī ghṛta*-6 teaspoonfuls with 300 ml of cow's milk with *pippali* honey;
(xxi) *Makaradhvaja* : 120-250 mg twice a day for 6 weeks; and
(xxii) *Svarṇaraja vangeśvara rasa:* 120-250 mg twice a day for 6 weeks.

List of Herbo-mineral *rasāyana* and *vajīkaraṇa* drugs (now in use):

- *Śrī Siddha Modaka*
- *Amṛtarṇava rasa*
- *Nīlakaṇṭha rasa*
- *Makaradhvaja rasa*
- *Siddhamakaradhvaja rasa*
- *Pūrṇachandra rasa*
- *Mahālasamīvilāsa rasa*
- *Aṣṭavakra rasa*
- *Trailokyacintāmaṇi rasa*
- *Śiva guṭikā*

CURRENT RESEARCH ON RASĀYANA DRUGS

The work associated with daily living is very hard. Modern man whirling about from morning to night is trying to accomplish the day's tasks. In this endeavour, often the nights are not exempt too. All this tends to wear out the body and when the bodily systems break down there are problems. Peptic ulcer, hypertension, nervous diarrhoeas, spastic colon, headaches, anxiety neurosis, and chronic fatigue are among the many disorders linked to stress. Some of them can be lethal, like myocardial infarction. Others do not kill but make life a misery, like insomnia.

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Orthodox medicine offers no solution to stress. Several drugs are available to provide symptomatic relief when individual systems break down, while a smaller number of drugs help them to recover. But there is practically none to prevent the system from breaking down in the first place. Ayurveda and other traditional systems of medicine as well as folk remedies in various parts of the world, however, have been using various plants for their reputed health promoting and rejuvenating effects. These agents preserve health rather than cure disease. Ayurveda offers, as noted before *Guḍūcī* (*Tinospora cordifolia*), *Śatāvarī* (*Asparagus racemosus*), *Aśhvagandha* (*Withania somnifera*), *Harītakī* (*Terminalia chebula*), *Āmalakī* (*Emblica officinalis*), *Punarnava* (*Boerhaavia diffusa*) and others. Modern medicine has no name for such remedies, but one has now been proposed—adaptogenic drugs. They are characterized by the qualities of improvement of endurance against stress, general resistance to infections, and retardation of the ageing process. Their activity can be analysed as anabolic, antimutagenic, anti-oxidant, immunomodulator, free radicle scavenging, etc.

The first problem facing researchers is to substantiate or refute the claims made on these plants mentioned above. Since a precise definition of stress is lacking and standardized conditions and objective parameters to measure stress are difficult to formulate, a straight clinical trial with these agents is often not feasible. A beginning has been made with animal models—testing endurance, adrenocortical function, anti-ulcer activity etc., in forced swimming, restrained, cold, anoxia and other forms of stress. Immunomodulatory activity is assessed more objectively, at tissue and cellular levels, such as through macrophage function, lymphocyte activity, cytokine secretion and in others ways. Rejuvenating properties are studied as effects on in vitro parameters of cellular ageing such as cell migration, the length of interphase and cellular life-span. However the entire field has generated a lot of controversy. Some view the very idea of an adaptogenic drug with scepticism. But researchers are hopeful. They reason that, given the subtle control mechanisms existing within the living body, especially the neurohumoral and endocrine coordination, it is not impossible to have remedies that act at key sites of integration to improve the overall adaptability of the system. Since the complex homoeostatic control mechanisms are themselves not fully understood, full explanation of the action of these plants can only come slowly through painstaking research.

The following are the results of researches carried out so far on the plants grouped as *Jīvaniya* in *Caraka saṃhitā* and *Rasāyana* in *Śārṅgadhara saṃhitā*.

Asparagus racemosus (Śatāvarī)

Roots and leaves and their different extracts have shown alterative, demulcent, aphrodisiac, anti-septic, galactagogue, hypoglycaemic, anti-cancer phagocytic, cardiotonic, hypotensive, anti-coagulant, enzymatic, and anti-viral activity.

Boerhaavia diffusa (Punarnava)

Roots and leaves and their different extracts have shown diuretic, anti-inflammatory, haematenic, anti-toxic, cardiotonic, myocardial stimulant, anti-bacterial, and anti-viral activity.

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Centella asiatica (Maṇḍūkaparṇi)

The whole plant and its extracts have shown alterative, insecticidal, hepatoprotective, hypotensive, respiratory stimulant, and haematinic activity.

Clitoria ternatea (Aparājita)

The leaves have shown anti-poisonous, diuretic, cholinergic, anti-histaminic, analgesic and anti-toxic activity.

Commiphora wightii (Guggulu)

The oleo-gum-resin has shown aphrodisiac, demulcent, alterative, emmenagogue, hematinic, anti-toxic, hypo-cholestraemic, hypolipidemic, and cardiotonic activity.

Emblica officinalis (Āmalakī)

The fruits have properties of appetizer, tonic, alterative, vermifuge, anti-bacterial, nutritive, stimulant and restorative activity.

Leptadenia reticulata (Jīvantī)

The leaves are stimulant, restorative, galactagogue, hypotensive, anti-bacterial, anti-cancer, and androgenic.

Terminalia chebula (Harītakī)

The fruits have alterative, tonic, antiperiodic, brain tonic, stimulant, restorative, anti-microbial and nutritive activity.

Tinospora cordifolia (Guḍūcī)

The stems have demonstrated antiperiodic, aphrodisiac, nutrient, alterative, diuretic, hypoglycaemic, anti-bacterial, anti-inflammatory, anti-allergic, and hepatoprotective activity.

It should be emphasized that *rasāyana* and *vājīkaraṇa* procedures which have been laid down in the Ayurvedic texts for prolonging life, retaining youthful vigour in old age and preventing diseases, would prove effective only in persons who have purity of mind and body, and complete self-control.

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CHAPTER 9

Rasaśāstra: Its Principles and Medicinal Aspects

Damodar Joshi

Rasaśāstra is one of the important branches of the Indian medicinal system. It began to develop in its own way with its alchemical roots during the 7th to 8th century A.D. although it could now be regarded as an extension of the *Rasāyana* (rejuvenation) and *Vājīkaraṇa* (virilization) branches of Ayurveda. The medicinal practices of *Rasaśāstra* may be taken as *rasa cikitsā*, the main objectives of which are to keep the body healthy, strong and full of life for a long time by improving the bodily resistance power as well as maintaining the equilibrium of the *dhātus* (body tissues), i.e. *dhātu sāmyatā*. In general, Ayurveda is not only the ancient system of medicine but also a science of life, laying more emphasis on achieving a long, healthy, and happy life, by promoting health even in the healthy indivisuals. The treatment or curative aspect is next in the order of the objectives of Ayurveda. There is no denying that *ārogya* (healthy state of life) lies at the root of all worldly affairs as well as the four *puruṣārthas (dharma, artha, kāma* and *mokṣa)*. If the healthy state is disturbed due to diseases, life becomes miserable and even comes to an end. Thus, one should always try to maintain the healthy state of life and the *Rasāyana* and *Vajīkaraṇa* branches of Ayurveda help greatly towards keeping a person healthy, youthful and in an enjoyable state.

In the classical texts of Ayurveda, *Caraka* and *Suśruta saṃhitās,* a number of vegetable and mineral drugs have been recognized for their rejuvenating and virilizing properties. Besides, certain pharmaceutical techniques or processes have also been dealt with in these texts, which help convert these drugs into suitable pharmaceutical forms for internal use in the body for achieving their therapeutic effects. But it may be pointed out that such pharmaceutical techniques are found suitable only for herbal drugs, but unsuitable for drugs of mineral origin. Possibly for this reason, in the classical Ayurvedic texts, we find a very limited use of drugs of mineral origin for therapeutic purposes.

It may be noted that the frequent use of drugs of mineral origin commenced in therapeutics only after the development of the *Rasaśāstra* and *rasacikitsā* in the realm of Ayurveda around the 11th cent A.D. During this period and even later, when the *Rasaśāstra*

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became fully developed, many new pharmaceutical processing techniques like *śodhana, jāraṇa, māraṇā, mūrchana,* and *satvapātana* etc. were accomplished which helped greatly in converting the drugs of mineral origin into the least toxic and pharmaceutically most effective. Such products are intended for keeping one healthy, strong, youthful and sexually potent throughout one's life, thus enjoying human life to its full satisfaction.

RASAŚĀSTRA

The term, *Rasaśāstra,* is composed of two words, i.e. *rasa* meaning mercury and *śāstra* meaning systematized knowledge. Hence in general *Rasaśāstra* means systematized knowledge relating to mercury, mercurial and mineral compounds. Broadly, the term *rasaśāstra,* carries two meanings: the first, is alchemy (*lohavedha/dhātuvāda)* or the processes and techniques concerned with the transformation of lower metals into higher metals, and the second, is related to therapeutics, (*dehavedha*) or the transformation of diseased and decaying body tissues into new, healthy and vigorous ones.

Govinda Bhagavatā Pāda, the author of one of the important texts, *Rasahṛdayatantra,* expressed the same views in his text: '*Rasaśāstra* is meant not only for *dhātuvāda* the transformation of lower metals into higher metals, but also for metabolic transformation, i.e. to make the body strong, healthy and youthful, so that one may live long and attain liberation (*mokṣa*) from worldly affairs'. The final objective of *Rasaśāstra*, therefore, is to achieve emancipation during one's own lifetime.

There is yet another connotation of the term *rasaśāstra*, namely, that it is the knowledge that would help to convert all kinds of drugs into a *rasa* (absorbable form), so that the processed drug may be used internally to obtain its desired therapeutic efficacy to its highest level. According to this meaning, *Rasaśāstra* means Ayurvedic pharmaceutics which deal with-varieties of drugs, their processing techniques, and their therapeutic uses.

Principles of Rasaśāstra

The principle aim of *Rasaśāstra* is to reduce or minimize the toxicity or deleterious effects of metals, minerals, poisonous, or sub-poisonous drugs and to reduce them to a fine state of sub-division as well as to make them into suitable compounds or absorbable forms, besides, conferring on them high therapeutic values. In this context, the following principles are very important.

(A) Reduction of toxicity or detoxification of drugs (śodhana) in general and of metallic and mineral drugs in particular.

The Techniques or procedures adopted for this purposes are as follows:

(i) Heating and quenching in various liquids (nirvāpa): This is the most common procedure applied for the general purification of almost all the metals and a few minerals. Towards this end, the metal which is to be subjected to a purification process is first heated to a red hot state and then quenched immediately in liquids like gingili (sesame)

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oil, buttermilk, cow's urine, some sour or acidic liquid and a decoction of horsegram for making these either brittle or soft. This operation is carried out several times (seven to twenty one times or even more) depending upon the hardness of the metal/minerals. As a result, the treated metals/minerals lose their hardness and compact structure. Further, the liquids used for the purpose are either acidic or alkaline in nature and sometimes these are used alternately which may also prove helpful in obtaining the desired results.

It is observed that thin metallic sheets, after the detoxification treatment, when examined under a microscope, have shown intergranular cleavage and precipitation in their structure (Figure 1).

(ii) Boiling in liquids (svedana in an apparatus called Dolāyantra): This is another widely applied procedure for purification. In a *Dolāyantra* (Figure 2), either the drug alone or with some other desired substances is tied in a cloth and suspended in a chosen liquid, like a *dolā* (swing), without touching the bottom of the vessel that contains the liquid. Then the liquid is allowed to boil by heating it for several hours or even days. The liquids for this purpose are generally acidic; but sometimes milk or cow's urine is also used.

The idea behind this method of purification is to remove soluble impurities from the metals or other substances subjected to this procedure. It is specially useful for the purification of mercury. As a result, not only soluble impurities of mercury are removed, but also, at the same time, certain soluble metallic contents which are present in the herbs used in this method may also get dissolved into mercury. This is evident from the results of chemical investigation of the processed mercury (Table I).

Table I. Precentage Purity of Mercury Samples

S. No.	*Samples*	*% purity*
1.	Crude mercury	97.81% W/w
2.	*Svedita* mercury	97.81% W/w
3.	*Mardita* mercury	96.70 % W/w
4.	*Mōrcchita* and utthapita mercury	95.96% W/w
5.	*Pātita* mercury	97.43% W/w
6.	*Rodhita* mercury	96.06% W/w
7.	*Niyamita* mercury	96.44% W/w
8.	*Dīpita* mercury	96.86% W/w

In the case of arsenical substances, purification is done by boiling it with milk for three hours (one *yāma*), by *the dolāyantra* method. In this case, the essential component of the arsenical substance gets dissolved in milk and, at the same time, certain good qualities of milk may also become inherent, thus making the processed product less toxic and suitable for therapeutic use. In the same way, copper is also purified by boiling it with cow's urine for three hours which may also remove its external impurities as well as its toxicity.

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(iii) Submersion in liquids (drava nikṣepa and ātapa sthāpana): This is yet another procedure to be adopted for the purification of certain drugs. In this method, the drugs are first cut into pieces or reduced to small bits. They are then placed or submerged in specified liquids for some days. Sometimes the submerged drugs are also exposed to sunrays along with the liquid with a view to subjecting it to mild heat. As a consequence of this procedure, the soluble part of the drugs may also get dissolved in the liquid (generally cow's urine) by the action of mild heat. This method is generally used for purifying aconite (*Vatsanābha)*. The experimental studies conducted on a drug purified by this method, have revealed that it becomes a cardiac stimulant after purification, instead of producing cardiac arrest or block, if it is not purified. Hence, the therapeutic value of the drug is completely reversed by the purificatory treatment. It may be noted that aconite is a widely used drug in a number of preparations for its anti-pyretic, anti-inflammatory, and analgesic properties.

(iv) Impregnation or trituration with liquids (bhāvāna): Impregnation is another important procedure to be employed for purifying drugs (metals and minerals). In this method certain liquids/ juices or extractives of chosen plants are added to the metallic/ mineral substances and well triturated with them. The quantity of fluids required for trituration should be such that the whole material could be immersed in them. The added liquid is then got impregnated into the metallic / mineral powders to lessen their toxic effects and also to enhance their potency or medicinal efficacy. This process of impregnation also helps in reducing the particle size of the drugs through trituration, thus increasing their capacity for absorption into the system. Generally, such a method is applicable to the purification of cinnabar (*hiṅgula* or mercuric sulphide) and green vitriol or ferrous sulphate (*kasīsa*).The juices of ginger and *Eclipta alba* (*bhṛṅgarāja*) are used respectively for trituration.

(v) Grinding and ***washing with liquids (mardana*** and ***kṣālana)***: Grinding and washing with hot/cold water is also a procedure employed for purification. It is mainly used for removing the external impurities of mercury; for this purpose, mercury, after being treated with *svedana saṃskāra*, heating or steaming process, (Figure 3), is ground well with some specified drugs and gruel, either in a hot or cold condition, for three days. Generally the grinding is done in a mortar kept hot. Its temperature may range between 45°C-50°C . The grinding of mercury in a hot condition with certain drugs and liquids helps in the dissolution of several impurities of mercury, and these could be removed by washing. It is also observed that, through this process, certain metallic contents present in the herbal drugs would also get dissolved in mercury which is evident from the decreased percentage of purity of mercury after this process.(Table 1). It would, however, appear that by subjecting mercury to this process chemically certain other ingredients are added to mercury and this is evident from the decreased percentage of mercury. Nevertheless, from the therapeutic point of view these ingredients (added materials) may be responsible for the reduction of the otherwise toxicity of mercury.

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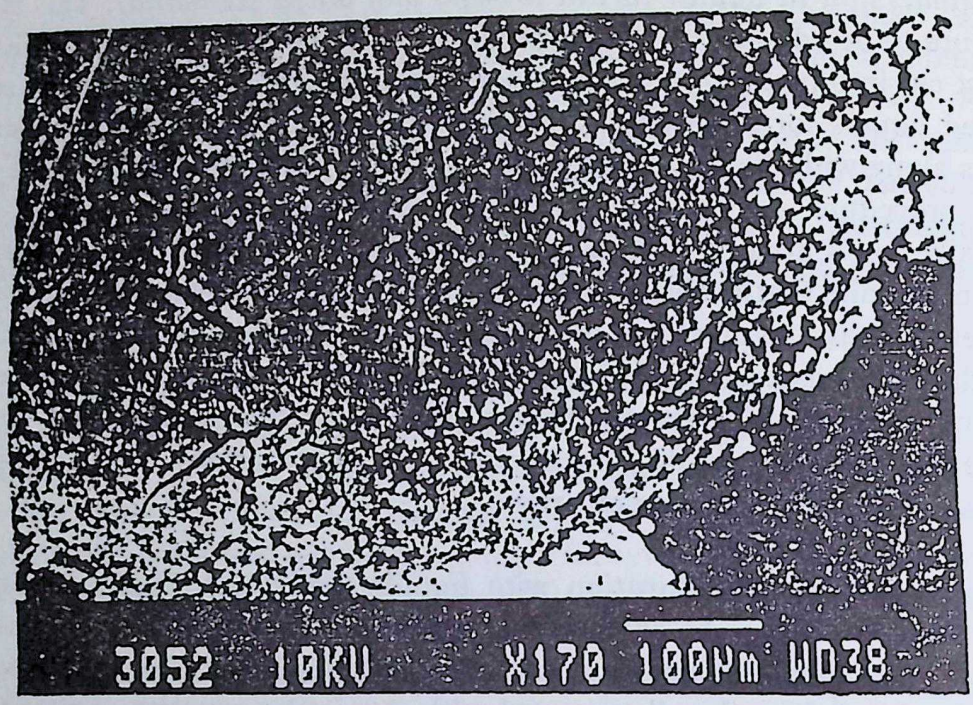

Fig. 1a. S.E.M. Photograph showing cracks after Śodhana.

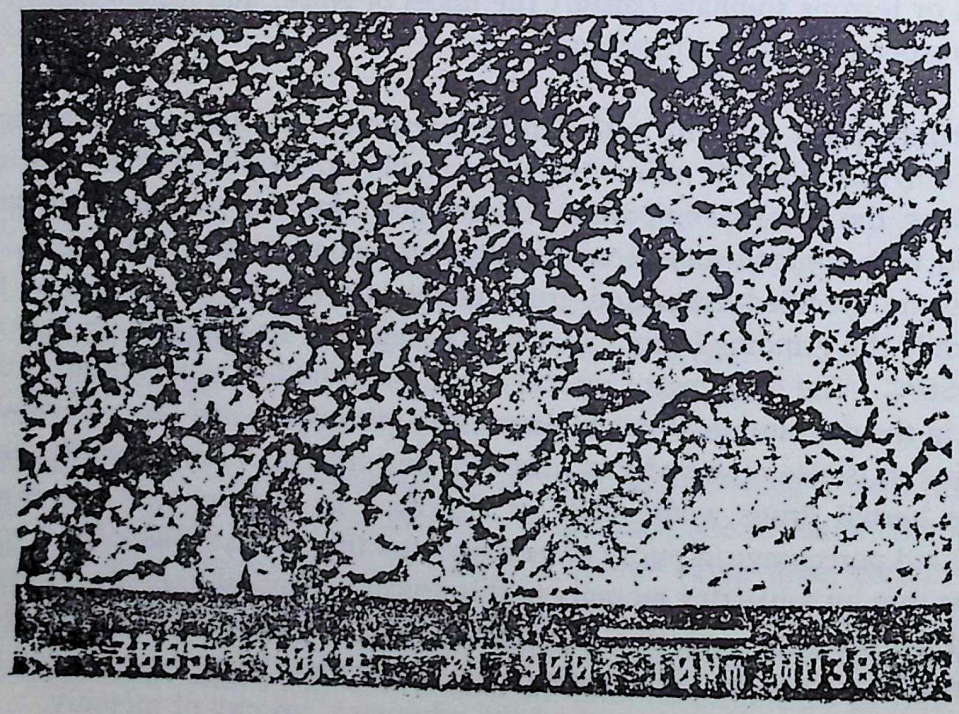

Fig. 1b. Showing magnified view of microcracks with porosity noted in Fig. 1 (a).

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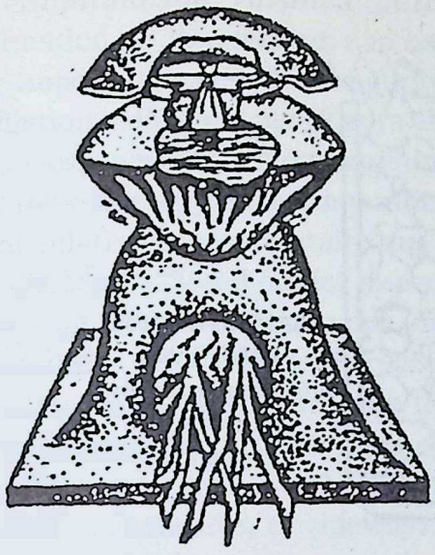

Fig. 2. The *dolā yantram*.

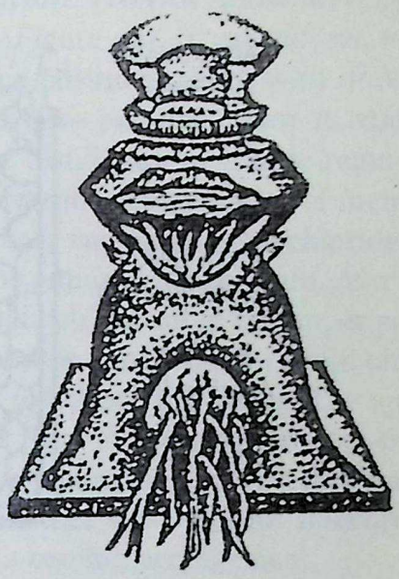

Fig. 3. The *svedanī yantram*.

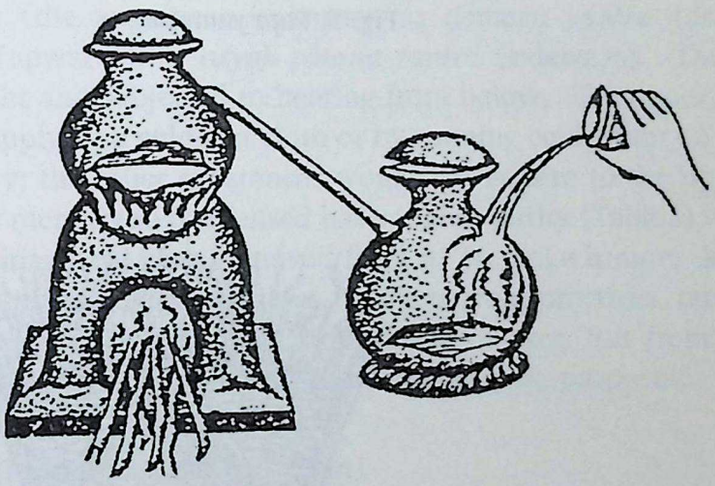

Fig. 4(a). The *adhahpātana yantram*.

Fig. 4(b). The *tiryākpātana yantram*.

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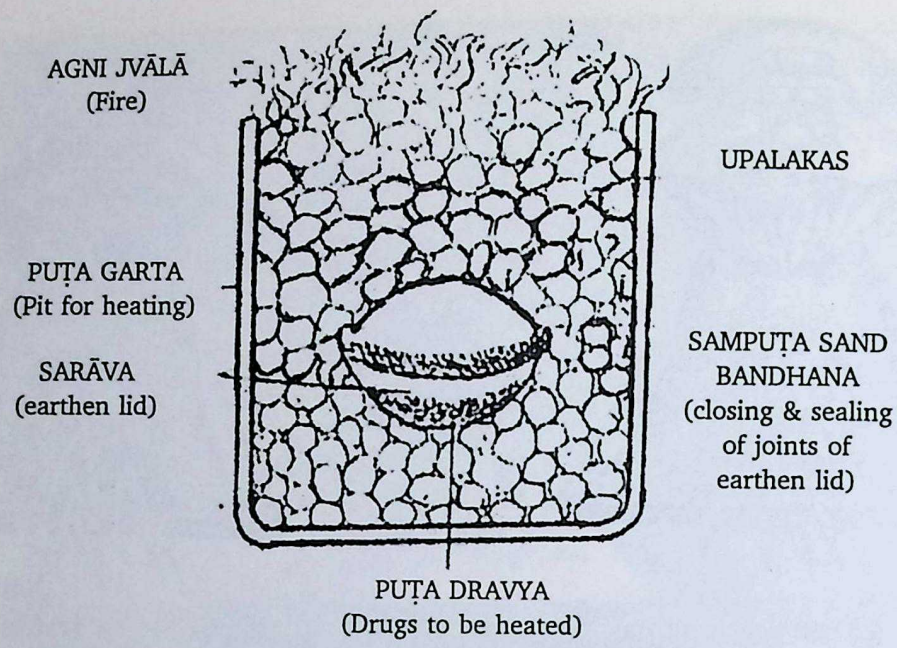

Fig. 5. *Puṭa yantram.*

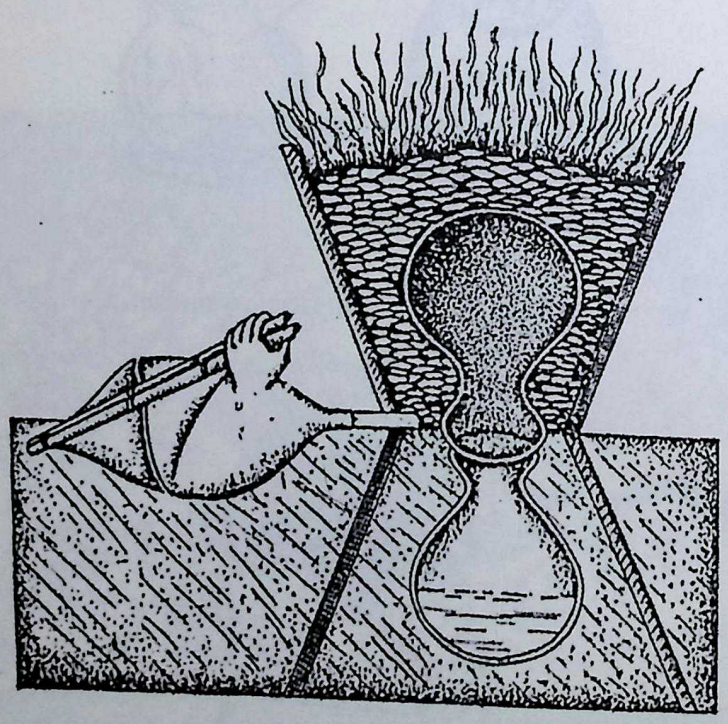

Fig. 6. The *koṣṭhī.*

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(vi) Sublimation (ūrdhva pātana) and ***distillation (tiryak pātana)***: Upward sublimation, *ūrdhva pātana*, and sideways distillation (Figure 4a), *tiryak pātana*, are also very important methods for purifying some drug compositions along with downward distillation, *adhaḥ pātana* (Figure 4b). These techniques have a distinct place in *rasaśāstra* processes, specially for mercury. It is obvious that the distillation methods remove not only the externally mixed impurities but also other deleterious components of mercry. In the distillation process certain drug compositions (mercury and ammonium chloride, etc.) are heated in a closed pot for a specified duration at the required temperature. As a result of heating, the pure compounds inside the vessel would sublime on to the upper portion of another pot and adhere there as deposit of fumes, thus leaving behind certain physical as well as chemical impurities in the lower portion of the closed apparatus. The purified material (mercury or ammonium chloride) is obtained from the upper portion of the pot or from that which is connected with it, depending upon the type of distillation—upwards, downwards, or sideways. In the last case, another vessel is kept sideways and a slanting tube is connected to the main vessel with a cooling arrangement.

Generally, mercury is mixed with a one-third part of copper and made into a paste or amalgam by grinding them together with lemon juice .It is then kept in the lower portion of the vessel (the apparatus is known as *ḍamaru yantra* (downwards) or *ūrdhvapatana yantra* (upwards), or *tiryak pātana yantra* (sideways). The apparatus is then closed, sealed tight and subjected to heating from below. The upper portion of the vessel is kept cool by applying a cold wet cloth or by running cold water on it to condense the vapours of mercury; the other substances would not adhere to the upper portion. It has been observed that mercury so condensed has a higher purity (Table.I) which indicates that some of its impurities have been removed from it. To make it more and more pure, the distillation may be repeated several times. In the current practices, purified mercury obtained by triple distillation is made available in the market. But from the Ayurvedic point of view it may not be considered useful for therapeutic purposes.

(B) Māraṇa Process (reduction into ash form)

The word *māraṇa* figuratively means to 'kill' a metal or to destroy its otherwise harmful metallic properties, and convert it into either an ash-like form or into a compound state, which would be suitable for absorption into the system. Here the main procedures involved are *bhāvāna* (impregnation of liquids/ extractives and grinding them till they assume solid form), and *puṭapāka (*application of heat) by *puṭa* (prolonged heating) system or *bālukā yantra* system (heating on sand bath) or directly on fire in an open atmosphere for a specified time at a specified degree of temperature, either once or repeatedly till the metal or mineral is converted into the desired compound forms, or in the form of ash.

The stages of the māraṇa process:

(i) Addition of māraṇa (reduction) drugs: During the *māraṇa* process, certain substances are added to the metals before subjecting them to impregnation or prolonged heating.

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Generally either mercury or its compounds like *kajjalī,* (black sulphide of mercury) *hiṅgula* (red sulphide of mercury) *or rasa sindūra* (another form of red sulphide of mercury), and others are used. Sometimes a few herbal drugs like -*Apāmārga pañcāṅga, haridrācūrṇa* (turmeric powder) and *pippala tvak cūrṇa* (powder of the bark of *pippala*) are also used. Similarly, sulphur or arsenic compounds like *haritāla* (orpiment; arsenic bisulphide), and *manaḥśilā* (realgar, arsenic trisulphide), are added. Sometimes lead and *mākṣika tāpya* are also used.

In the well-known text, the *Rasaratnasamuccaya,* the substances to be used in the *māraṇa* process have been divided into four categories on the basis of their medicinal effects in relation to the *bhasmas* (calcined ashes). If the *bhasmas* are prepared by adding mercury or its compounds in the process, such *bhasmas* are regarded as superior or of the best category. If they are prepared by the addition of chosen herbs, the resulting *bhasmas* are regarded as of the second category, indicating their medium quality. On the other hand, the the *bhasmas* prepared by the addition of sulphur or its arsenic compounds like orpiment and realgar are considered to be of (third category) inferior quality. In case where some metallic substances are used, then the *bhasmas* are considered to be of a much inferior quality (fourth category). *Bhasmas* of this type would have bad or undesirable effects (*durguṇaprada)* and hence these are generally not considered useful for therapeutic purposes. Thus, while preparing *bhasmas,* a physician, well versed in *rasaśāstra*, has to be very careful in selecting the substances to be used for the *māraṇa* methods so that the resulting *bhasmas* should be of the best quality as far as possible from the point of view of their therapeutic effectiveness.

(ii) Bhāvana (trituration) and mardana (grinding): After adding the therapeutically desired *māraṇa* substances, including the metals they are subjected to trituration and grinding, by adding the juices of lemon, *Kumārī (Aloe indica) Kāñcanara* juice/decoction, *tulasi (basil plant)*, the decoction of *triphalā* (three *myrobalans*) and grinding the mixture to a solid consistency. This method helps in mixing the *māraṇa* substances. They are mixed uniformly and the liquid gets impregnated into the metallic or mineral particles, leading to the possible formation of organo-metallic compounds. After drying, the mass is divided into small pieces and formed into pellets. These are then dried and kept closed in what is called *śarāvāsaṃpuṭa* (a closed assembly of two shallow earthen lids) or in a *mūṣā*(crucible) and sealed. After drying it again, the apparatus is subjected to prolonged heating generally by the *puṭa* system.

PUṬAPĀKA (PROLONGED HEATING)

For the preparation of *bhasmas,* the metals/minerals processed as above should be subjected to *Puṭapāka* (a system of heating). In this system, usually the fire or heat of cow-dung cakes is utilized for prolonged heating. The quantity of cowdung cakes depends on the type of *puṭa* recommended for the preparation of a particular *bhasma.* The mixture of drugs (metals or minerals) is placed in a crucible or in a suitable container, is put in the middle of the cow-dung heap so that the heat may be applied from all around

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(Figure 5). It is then allowed to cool on its own, the container is taken out, and the drug is removed from it for further processing.

Subjecting the drugs to the action of heat in a *puṭa* or *puṭapāka* is a characteristic of several preparations in the *rasaśāstra*. This relates to the prescribed quantum of heat or the measure of the temperature ranges to which specially a metal, mineral or gem is to be subjected for its *pāka* (conversion into the desired form), since neither more nor less heat is considered desirable for their conversion into *bhasma* form and to make it efficacious and useful as medicine. To achieve this objective, the following types of *puṭas* have been described in the *Rasaśāstra* texts for the application of different ranges of temparature to the drugs, on the basis of what is called their heat tolerance power.

***(i) Mahā puṭa*:** As the name indicates, it is the largest *puṭa* from the point of view of its size and fuel consumption. The size of its pit is 2 *hasta* (about 90 cm) in depth as well as breadth. This contrivance is filled with as many as 1500 forest dung-cakes of normal size, of which 1000 are kept below the crucible (*mūsa*) or a suitable container (*saṃpuṭa*), while the remaining cow-dung cakes are kept over the container and the fire is started. In this *puṭa*, intense or strong heat (900°C -1000°C) is maintained for a longer duration (1 to 1½ hours) depending upon the quality of fuel, place and season as well as the quantity of *bhasma* drug and its heat tolerance power. Generally, big pharmacies or commerical concerns use the *mahapuṭa* for the preparation of larger batches of *bhasmas* like those of iron (*loha*) and mica (*abhraka*).

***(ii) Gaja puṭa*:** This is the second largest *puṭa*. The size of its pit is one *rājahasta* (about 56 cm) in depth as well as in breadth. The quantity of fuel needed for this contrivance is 1000 forest dung–cakes of usual size, which usually are to be kept above and below a container (normally, two–thirds of them below and one third above). *Gaja puṭa* is also intended for imparting strong heat (850°C 950°C) for a long time (about 45-60 minutes), depending upon the quality of cow-dung cakes, place, and season.

***(iii) Varāha puṭa*:** This is a medium type of *puṭa*, i.e. the size of this apparatus is mentioned as one *aratni* (about 40 cm) in depth and breadth. The quantity of fuel is not specified in this case, though cow-dung cakes may be used sufficiently for filling it. However, the temperature attained is not very high and its maintenance time is also low (i.e, about 800°C for about 30-40 minutes only).

***(iv) Ardha Gajapuṭa*:** The details about this *puṭa* have not been described in any of the *rasaśāstra* texts. Nevertheless, while describing the methods of the preparation of various *bhasmas*, this contrivance has been mentioned. Hence in the author's opinion its size could be just half the size of *Gajapuṭa*, even smaller than *Varāhapuṭa* i.e. its depth may be about 30 cm and width about 55 cm. And the fuel required to fill up a pit of this size may be considered sufficient for heating a substance to the desired extent, although there may not be much diffculty in attaining a high temperature. But its maintenance and cooling time could be much less (700° C–750°C; for about 15–20 minutes). Both *Varāhapuṭa* and *Ardha Gajapuṭa* may be regarded as of medium types.

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***(v) Kukkuṭa puṭa*:** This may be considered as one of the small *puṭas.* Its ideal size should be 12 *aṅgulas* or *one vitasti* (about 23 cm), and 10–15 cow-dung cakes may be the required fuel quantity. However, its dimensions vary according to some *Rasaśāstra* texts. In the original text of *Rasaratnasamuccaya,* its size is mentioned as two *vitasti* which is about 45 cm and thus it becomes even bigger than the size of *Varāhapuṭa,* the size of which is 40 cm; hence its two *vitasti* size may not be correct. In some other texts, its size is mentioned as 16 *aṅgulas* which correspond to 30 cm only. But on logical grounds the size of *Kukkuṭapuṭa* should be smaller than *Varāhapuṭa* or *Ardhagajapuṭa* and bigger than another type called *Kapota puṭa* which is normally over the ground and applied heat with only 8 cow-dung cakes. As for the quantity of heat generated in *Kukkuṭa puṭa,* the maximum temperature attained may be 600°–650°C which may be maintained for 20–25 minutes after which the temperature starts declining. This *puṭa* may be employed for the application of heat to what are known as soft *(mṛdu)* substances, like gold or silver for obtaining their *bhasmas.*

***(vi) Kapota Puṭa*:** In practice, this is a type in which heat is not given from below but above the ground. Generally eight cowdung cakes are employed as a source of fuel in this heating contrivance. There is, however, no reference in the literature to its dimensions. Thus it is the smallest *puṭa* which is recommended for the preparation specially of the *bhasma* of gold and mercury or its 'fixation' where less than 500°C temperature is required, and normally the heating time is less than 10–15 minutes after which it starts cooling in an open atmosphere.

***(vii) Lāvaka Puṭa*:** In this *puṭa* either husk *(tuṣa)*or dung cake powder is used as fuel, instead of the cakes. As a result, high temperatures may not be attained, and its range may be between 100°C–200°C only for 20–25 minutes. The quantity of husk mentioned in the texts is only one *pala* (50g). This contrivance is also used for preparing the *bhasma* of mercury and no other metals. The whole process (*bhāvana,mardana and puṭa-pāka*) is repeated several times or till the *bhasma* thus obtained attains the desired characteristics confirmed by certain tests.

Though the *puṭa* system of prolonged heating is generally employed for the preparation of *bhasmas,* there are other systems of heating like the following:

(a) Vālukāyantra system of heating*:** In this system, the heat is applied to a container like a bottle or a crucible having the desired substances in it and placed over a sand bath. The mouth of the container is kept open initially, but in the last stage, it is closed. Only in a few cases, the mouth of the container is kept open throughout the process. When a bottle is used, it is wrapped in seven layers of cloth smeared with sticky mud. Heating over a sand bath is usually adopted for the preparation of certain *bhasmas* of mercury including the rejuvenating compositions like ***makaradhvaja (mercuric sulphide, to which gold is added). Initially, mild heat is applied, and it is gradually raised to medium and intense heat. The expected temperature of mild heat may range between 150°C and 200°C which would be denoted by the melting and the starting of fuming stage; the medium heat may be between 350°C and 400°C leading to boiling and profuse fuming.

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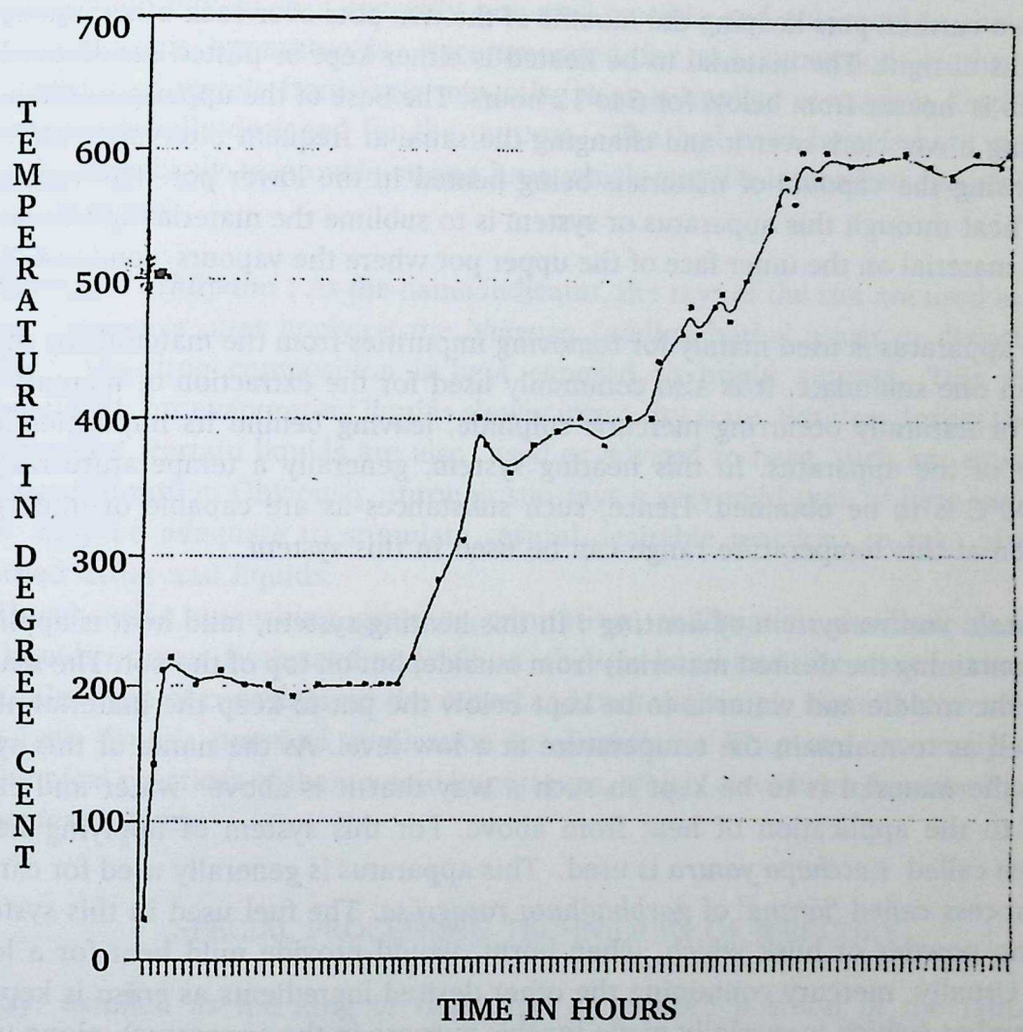
At this stage, sulphur boils in the bottle giving rise to copious fumes which come out of the mouth of the bottle. Sometimes, fumes may cause blockage of the mouth of the bottle by adhering to it. If the quantity of sulphur is more and the temperature is also high, the boiling material may also come out of the bottle. Hence, at this stage, adequate care has to be taken to control the temperature and to frequently remove the blockage at the mouth of the bottle so as to prevent the bursting of the bottle due to the pressure of fumes. This is done by inserting a red hot iron rod in the mouth of the bottle frequently. Finally when the heating is intense and the temperature is over to 550°C-600°C (Chart 1),



bluish flames start coming out as a result of high temperature, and the extra quantity of sulphur of the compound in the bottle starts burning quickly. The height of the flame may go up to 5–8 cm from the mouth of the bottle depending upon the temperature and the amount of sulphur present in the compound. After an hour or so, when the amount of sulphur becomes less, but being sufficient for compound formation as a result of its burning, the intensity of flame also comes down and the burning of extra sulphur slowly disappears indicating the completion of the process i.e. the formation of mercuric sulphide. At this stage, a test known as *śīta śalākā* is carried out. For this purpose, a cold iron rod is inserted into the bottle and if it comes out clean then the test is positive and confirms

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the absence of extra sulphur. Now the mouth of the bottle is corked and sealed properly and heating is also stopped. In the case of an electric furnace, it is switched off and the apparatus is allowed to cool on its own. Usually, the process may be completed within 9 to 12 hours provided continuous heat is applied. If a vertical electric furance is used as a source of heat the time may be 2-3 hours less, as in this case the chances of heat loss are less.

(b) Ḍamaru yantra system of heating: *Ḍamaru yantra* is an apparatus generally shaped like an hour-glass, i.e. narrow in the middle and broad at both the ends. It is set up by joining two earthen pots keeping the mouths of the two pots over each other and sealing the mouths airtight. The material to be heated is either kept or pasted inside the lower pot, which is heated from below for 6 to 12 hours. The base of the upper pot is kept cool by applying a wet cloth over it and changing the same at frequent intervals with a view to condensing the vapours of materials being heated in the lower pot. The purpose of applying heat through this apparatus or system is to sublime the material and collect the sublimed material on the inner face of the upper pot where the vapours condense due to cooling.

This apparatus is used mainly for removing impurities from the materials by making the chosen one sublimate. It is also commonly used for the extraction of mercury from cinnabar or naturally occurring mercuric sulphide, leaving behind its impurities in the lower pot of the apparatus. In this heating system, generally a temperature range of 500°C–600°C is to be obtained. Hence, such substances as are capable of undergoing sublimation at this temperature range can be used in this system.

(c) Somānala yantra system of heating : In this heating system, mild heat is applied to the pot (containing the desired material) from outside, but on top of the pot. The material is kept in the middle and water is to be kept below the pot to keep the material always cool as well as to maintain the temperature at a low level. As the name of this system indicates, the material is to be kept in such a way that it is above water and can be subjected to the application of heat from above. For this system of applying heat, a contrivance called *Kacchapa yantra* is used. This apparatus is generally used for carrying out the process called *'jāraṇa'* of *garbhadhuta rasagrāsa.* The fuel used in this system is either dung powder or husk which, when burnt, would provide mild heat for a longer duration. Usually mercury containing the other desired ingredients as *grāsa* is kept in a closed chamber (which is specially made for this purpose in the apparatus), along with a mixture of certain salts, with acidic or alkaline drug compositions.

(d) Tapta Khalva Yantra system of heating : In this contrivance, slow or mild heat is applied to the chosen drug, which is ground well in a mortar (*khalva*) made of iron. The fuel used in this system is either dung powder or husk which, when burnt, would give a temperature range between 45°C-50°C. In the ambience of this temperature, the material (generally mercury) is ground with prescribed drugs continuously for three days to remove its impurities.

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(e) Dolā Yantra system of heating : In this contrivance, heat is applied through boiling liquids (acidic, alkaline, or neutral) like sour gruel, cow's urine, milk, or some vegetable extractives, kept in a pot. The material is tied in a cloth bundle which is kept suspended in the boiling liquids for a specified period, (generally one *yāma* to 7 days), for subjecting it to the action of heat through the boiling liquid. (Figure 2) This system of applying heat is used for the purification of several drug compositions, which may have liquid soluble impurties at about 100°C temperature.

(f) Dhmāpana or ***bhastra dhmāna*** or ***Koṣṭhi yantra system of heating*** : The material to be processed is kept in a specially prepared-crucible and subjected to the action of strong heat. This apparatus is recommended for the extraction of the 'essence' (*satvapātana*) of metals from their minerals. Heat is applied through a *Koṣṭhi* furnace (Figure 6), specially designed for the purpose. The fuel used here is hard charcoal in pieces that are likely to provide strong heat which may be intensified further by using bellows *(blowers)*.

(g) Sūryātapa Sthāpana : As the name indicates, the rays of the sun are used as a source of heat. During or after applying the *bhāvana* (adding herbal juices or decoctions and grinding), the drug composition is kept exposed to bright sunrays. This method is recommended for evaporating liquids slowly into a dry state. Besides, during the process of purification, certain liquids are also used or advised to have, such an exposure for the desired duration. Obviously, through sun rays a very mild type of heat is generated, which may be adequate to stimulate several desirable reactions to take place in the concerned drugs and liquids.

Thus heating, quenching, grinding, trituration , sublimation, distillation and heating with liquids or over both sand and salt on the one hand and the use of crucibles, pots or a similar type of container on the otherhand, are the simple but effective mechanisms which have found practical application in *Rasaśāstra*. They are extremely useful for iatrochemical practices of therapeutic importance, which have been described in detail in the *rasaśāstra* texts.

SPECIAL PROCESSING TECHNIQUES OF MERCURY

Mercury, extolled as the king of *rasas,* has an exalted position in the iatrochemical operations. It is, therefore, necessary to understand the processes associated with mercury itself. Though the processing techniques (*samskāras)* of mercury are eighteen in number, the first eight techniques are considered very important from the point of view not only of reducing its toxicity but, more importantly, of potentiating its effective therapeutic (*dehavedha)* and alchemical (*lohavedha*) properties.

The following eight processes which mercury has to undergo are based on the descriptions given in an important text, the *Rasaratnasamuccaya*, except one, namely, the distillation (*pātana*) process. As for this process, instead of the upward, downward and sideways distillation methods, a process in a modified distillation apparatus has been

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given below and the process itself is to be repeated three times. And for making the paste or amalgams form of mercury (*pārada piṣṭi*), copper foils are used with mercury in the ratio of 3:1 by weight each time. It should be noted that no other drugs are used for making this type of mercurial form.

(i) Svedana samskāra (heating or steaming) : The main objective of this method is to loosen the associated impurities of mercury so that they can be removed easily. The substances generally used in this type of process are: *Pārada* mercury 1 part and its sixteenth part of *Āsurī (Brassica juncea Linn); paṭu* (common rock salt*); Kaṭuka traya(*three pungent drugs*); Citraka (Plumbago zeylanica Linn); Ārdraka* (*Zingiber officinale* roscoe); and *Mūlaka (Raphanu sativus Linn)*. These are mixed and pasted with sour gruel liquid and heated to boiling over mild heat (*svedana*) for three days in the apparatus known as *Dolāyantra* (Figure 2).

Procedure : Take the substances in the prescribed quantities and make them into a fine paste by grinding them with sour gruel in a mortar or on a stone plate. Place the paste on a banana leaf and also put mercury into it to make in bundle form tie the material in a cloth and suspend this in a *Dolāyantra* containing sour gruel. Apply moderate heat from below for three days so that the material is exposed to boiling liquid. Remove the cloth bundle after three days, and collect the treated mercury and wash it with hot water to make it free from the other contaminated substances.

(ii) Mardana saṃskāra (grinding in hot mortar): The principal objective of this method is to remove or destroy the external impurities of mercury. Mercury which has been subjected to the action of boiling liquid (as mentioned above) is to be treated with 1/16th part of the paste made from the following: jaggery, burnt wool, rock salt, house-soot, brick powder, fine powder of *Āsurī* (*Brassica juncea Linn*) and sour gruel.

These substances are ground well with mercury in a hot mortar for three days, then collected from the mortar and washed with hot water to remove other contaminated materials (those mixed with mercury).

(iii) Mūrchanā saṃskāra (Swooning): By this process, the three deleterious (*doṣas*) components of mercury are sought to be removed, namely, *mala, bahni,* and *viṣa*. The procedure is as follows: Mercurial substance which has undergone the above two processes, is to be mixed with the juice of Kumārī *(Aloe indica) triphalā* (*Terminalia chebula retz*; *Terminalia Belerica Roxb*; and *Emblica officinalis*, Gertn) and *Citraka* (*Plumbago zeylanica Linn*). It is then ground well in an iron mortar usually for six days or till the mass attains the form of a paste or fine powder called the *naṣṭa piṣṭa* of mercury.

After the completion of this process, mercury has to regain its original form and, for this purpose, the paste should be washed very carefully with hot water to convert the same back into mercurial form. If necessary, the remaining portion of the paste should be subjected to the sublimation process to minimize the loss of mercury during processing, which is repeated three to seven times. It is important to note here that the regaining of entire mercury in liquid form is very difficult, hence a separate process known as *(Utthāpana)* has been mentioned in almost all the *Rasaśāstra* texts.

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(iv) Utthāpana saṃskāra (regaining of mercurial form): This is accomplished by washing *naṣṭa piṣṭa* mercurial form with hot water or gruel, or is best done by subliming it in a contrivance called *Ḍamaru yantra* or *Pātana yantra*.

(v) Pātana saṃskāra (sublimation or distillation): As a result of sublimation, the mercurial mass is freed from the impurities caused by some vitiating components (*yaugika doṣas*) like lead and tin which are associated with mercury either naturally or artificially. For this purpose, although the texts speak of sublimation either upwards, downwards or sideways, a modified contrivance has been developed which has been found very useful for sublimating process as follows: Procedure: generally, pure copper foils (1/3 part) are amalgamated with mercurial mass by grinding them well with lemon juice. This amalgam is placed in the modified contrivance, sealed properly and heated from below (at 500°C – 600°C) and water from a tap is allowed to flow constantly on the cooling tube. Mercury vapours begin to condense into mercury and the process is continued till mercury is recovered completely.

(vi) Rodhana or Bodhana Saṃskāra (potentiation of mercury): In the next stage, the recovered mercury is subjected to a process called *rodhana* or *bodhana saṃskāra* which is intended to potentiate it, since, according to the texts like the *Rasahṛdayatantra*, mercury having undergone the previous five processes would have lost its potency; in fact, it might have attained an undesirable state of impotency (*ṣaṇḍhatva*). The imagery is that its 'face' (*mukha*) has to be improved.

Procedure: In order to potentiate mercury afresh, it is placed in a crucible or bottle and either ground or kept in a saturated solution of rock salt for three to twenty one days, or it is placed in a glass vessel and kept underground or in a cool and dark place for seven to twenty one days, after which mercury is expected to have become potentiated, its 'face' improved, that is, its capacity for consuming other chosen metals or minerals increased.

(vii) Niyamana saṃskāra (restraining mercury): Sequentially, the next process called *niyamana* is to control the mobility of mercury which it might have acquired consequent upon its potentiation. For this purpose, mercury which has undergone the previous treatment is processed with substances like betel leaves (*Piper betel*), garlic, rock salt, *Eclipta alba* (*Bhṛngarāja*). *Memordica dioca* (*Karkoṭi*) and tamarind, each being 1/16th part by weight of mercury. The procedure is to grind the above constituents with gruel into a fine and smooth paste. This paste is put on a plantain leaf with mercury and tied in a cloth bundle and suspended like a swing (*Dolāyantra*) in the boiling sour gruel (*svedana*) kept in a pot which is subjected to moderate heat from below. After three days, the cloth bundle is taken out, and its contents are washed well with hot water.

(viii) Dīpana Saṃskāra (appetization of mercury): The eighth and last process is called '*dīpana*' which means kindling or 'appetization' of mercury in the sense that its digestive power for 'consuming' (*grāsa*) the desired metal or mineral or the essence of mica is improved. In this process, mercury which has undergone the aforesaid seven treatments is mixed with alum (*saurāṣṭrī*), ferrous sulphate, (*kasīsa*), borax (*ṭankaṇa*), black pepper

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(*Piper nigrum linn*), (*marīca*), rock salt, (*saindhava*), *āsurī* or *rājika* (*Brasica compestris, linn*) and (*śigru*) (*Moringa plerigosperma geartn*), each being 1/16th part by the weight of mercury. These are ground well into a pasty mass and subjected to the action of boiling sour gruel or any other boiling acidic liquid in *Dolāyantra*, for three days in a way similar to the seventh process. Thereafter, mercurial material is collected and washed with warm water. Mercury is now in a 'kindled' state, capable of 'consuming' or absorbing the required metallic or mineral substances.

OTHER PROCESSES

Mūrcchanā (compounding of mercury)

Mūrcchanā is one of the important methods for converting mercury into a suitable compound form which can be taken internally for curing certain diseases and which is not in the nature of an incinerated ash form (*bhasma*). There are two types of compounding: (i) processing mercury with sulphur (*sagandha mūrcchaṅā*); and (ii) without sulphur (*nirgaṅdha mūrcchanā*). Between the two, the first one is more common, easy to prepare and the least toxic. Hence it is highly popular in therapeutic practice. The second, on the other hand, is very toxic, besides, its method of preparation is a difficult one.

The two most common forms of the compounds of sulphur and mercury are the black sulphide of mercury (*kajjalī* or *parpaṭi*) and the red mercuric sulphide (*rasasindūra, makaradhvaja*, etc).The black variety is prepared by mixing mercury and sulphur, both in

Table 2. Results Of Histopathological Study

Name of the Tissue	*Control Group*	*Treated Groups*					
		16 ppm. Crude	*Dose processed*	*20 ppm. Crude*	*dose processed*	*25 ppm. Crude*	*dose processed*
1. Liver	No change	Venous congestion	No change	Venous congestion	No change	Necrosis venous congestion (Fig.1)	No change (Fig.2)
2. Kidney	No change	No change	No change	Venous congestion	Slight congestion	Necrosis venous & fatty degeneration (Fig. 3)	Slight fatty degeneration (Fig.4)
3. Spleen	No change	• Venous congestion	No change	Venous congestion	No change	Venous congestion (Fig.5)	No change (Fig.6)

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purified states, and grinding them well for a specified time or till a dull black compound is formed. It is then converted into *parpaṭi* or dull flake-form by applying mild heat so that it melts and the pasty mass can now be placed on a plantain leaf or some other smooth surface and pressed cooled. If, on the other hand, purified mercury and sulphur in proper proportion are made into the black sulphide form, placed in a glass bottle and heated for a longer duration over a sand-bath (*Vālukā yantra*), gradually applying mild, medium and then intense heat, the red sulphide is formed and collects at the inner portions of the neck of the bottle. On Koviking and cooling, the bottle is broken and the red compound is scraped and finely powdered. From the therapeutic point of view, the red sulphide is claimed to be more effective than the black one, since the former is less toxic than the latter, as evidenced by studies based on animal experiments conducted by the Rasaśāstra and the Pathology Department of Banaras Hindu University. The histopathological examination of vital organs like liver, kidney, spleen and others has revealed that the red mercuric sulphide, when administered in a suitable dosage form to the animals, even four times the normally recommended dose given for three weeks to forty days, proved the least toxic (Table 2) unlike the black sulphide.

Importance of *Gandhaka jāraṇa*

Another important process of mercury is called *Jāraṇa* in which purified sulphur in different proportions is added to mercury and allowed to burn by heating (400°C to 600°C) for the prescribed duration or till the extra quantity of sulphur (which is not required after it forms a compound) burns completely. The contrivance used for this purpose is generally a sand-bath (vālukāyantra) although the other *yantras* also are recommended for the purpose.

It has been claimed in the *Rasaśāstra* texts that mercury, when subjected to this process, becomes highly potentiated and acquires many pharmacological and therapeutic properties, and its toxicity would be reduced to a great extent. It has been further claimed that unless mercury and sulphur in more than 1:6 ratio are not processed and the extra sulphur is burnt, the mercurial compound does not acquire the disease-curing capability or its therapeutic effectiveness. This process is known as *ṣaḍguṇa* (6 times) *bali jāraṇa* which is adopted for preparations like *rasasindūra* and *makaradhvaja* which are found to be therapeutically most effective.

It may be pointed out here that, according to the law of chemical composition, the formation of red sulphide of mercury requires sulphur in the ratio of 1:6 . But, generally, in Ayurvedic practice in the preparation of *kajjalī, Rasasindūra,* and *Makaradhvaja*, the basic ingredients—mercury and sulphur—are added either in equal quantity or sulphur twice the weight of mercury, and this amounts either to six or twelve times more sulphur than the required quantity. Hence, the extra sulphur present in the basic material has to burn during the preparation by heating, and this induces many therapeutic properties into the preparation. Further the very process (*Jāraṇa*) may also be claimed responsible for the difference in the therapeutic values of the Ayurvedic red sulphide in contradistinction to the commercial sample of red sulphide of mercury.

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It will, therefore, be observed that the potency and the efficacy of mercuric sulphide increases in proportion to the amount of sulphur mixed and burnt with mercury. The textual references not only support the above statement but even emphasize that mercury processed with six times its weight of sulphur is more powerful than that processed either with an equal quantity or two times its weight of sulphur. Likewise, if the proportion of sulphur to mercury is 100 or 1000 times, the efficacy is stated to increase in that proportion. The *Rasendracintāmaṇi*, a text of the medieval period, exhorts that the compounding (*mūrchana)* process should be carried out with mercury and sulphur in different raised proportions to make mercury hundred to a thousand times more powerful!

Solidification (bandhana) of mercury

This is a process in which mercury is made into either a solid or hard form from its liquid state, so that its quick movement (*cāñcalya*) and the associated undesirable properties (*durgrahatva*) are controlled or restricted. According to the text, *Rasaprakāśasudhākara,* herbs, gems, gold, lead, or tin could be used for this purpose. Of these, the solidification using herbs is the best; with gems it would be medium; with metals like gold, inferior, and with tin and lead, the most inferior. There is the fifth type of solidification called *druti bandha* in which 'liquified' mica is used. This method yields, according to the process involved, either a semi-solid or a smooth paste, or thin solid layers, or ash-fine powder.

According to the *rasaśāstra* texts, the solidified (*baddha*) mercury should be hard and have a shining white colour similar to that of full-moon light. When mercury is subjected to the process of '*compounding*' (*mūrchanā*), it could become not only solid but also have therapeutic value. But mere solidified mercury may not always possess the desired medicinal values.

The *Rasaratnasamuccaya*, an important text of the 13th or 14th century, speaks of 25 types of solidification of mercury and not all the technical terms of these types which are in Sanskrit can be translated exactly into English. The text also mentions the 26th type which is not found useful therapeutically, but the product is recommended for increasing virility and sexual satisfaction in women. In the *Rasārṇava*, a text of an earlier period, (11th cent. A.D.) only three types of solidification are mentioned. Another text, the *Rasendracūdāmaṇi* of a later period, (12th cent. A.D.) describes certain prerequisites for the solidification process. In any case the process of solidifying mercury has to be accomplished with great care.

Metal extraction (Satvapātna) method

Extraction of 'essence' or metallic forms from minerals (*satvapātana*) is another important process which has been mentioned in *Rasaśāstra*. The extracted metals (*satvas*) have their own importance in mercurial processing as mercury can not consume or absorb the desired mineral as it is, hence its metal content (satva/essence) has to be separated or extracted from the minerals first and then added to mercury in prescribed amount for its

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jāraṇa (digestion) in mercury. This is done with a view to preventing or restricting mercury from vaporizing on heating at high temperatures. It also helps mercury in its *rañjana* (getting a golden or other colour).

It is further mentioned in *Rasaśāstra* texts that, apart form *abhraka* (mica) *satva*, there is no other substance which, when added to mercury, can prevent its vaporization even at high temperatures (*rasa pakṣakartana samarthaḥ*). From the point of view of mercurial processing, *abhraka satva* and *makṣikā satvas* (mica essence and chalcopyrite essence) are very important.

Procedure for metal extraction (satvāpātana): Take purified mica or chalcopyrites, mix 1/4th part of borax (*ṭaṅkaṇa*), and grind both properly after adding *musalī rasa* or any acidic liquid. On drying, divide the mass into small round balls, put them in a crucible (*mūsa*), and apply strong heat in a specially designed furnace known as *Aṅgārakoṣṭhi*. If necessary, intensify the heat by blowing air through blowers to obtain the molten mass. This is poured out and, on cooling, the metal separates from the slag. It is a commonly employed method for metal extraction from minerals.

It has also been mentioned in *rasaśāstra* texts that the extracted metals (*satvas*) are not only useful in mercurial processes, but are also used in therapeutics after subjecting them to *māraṇa* (ash-fine) processes depending upon the nature of the metal.

Ash-making (māraṇa) method of mercury

For obtaining incinerated ash-fine powder (*bhasma*) the process is called *māraṇa* (ash-making). It is important to note that, in this process, mercury, even at mild temperatures goes out as vapours, hence it has to be first subjected to a process called jāraṇa, with substances, like mica, sulphur and others. Since this is rather cumbersome, at present the red sulphide of mercury (*rasasindūra*) is in use insteed of ash-form of solidified mercury.

There are other compounds of mercury in the form of *bhasmas*. The *Rasaprakāśasudhākara* mentions three types of *bhasmas*: the white one (*śveta*) which is also called *rasakarpūra* (mercuric chloride); the red one is called *Udayabhāskara rasa,* a type of *rasasindūra*), and the black variety is called (*parpaṭī* or *mahārasa poṭṭali*). The text also describes their methods of preparation using several types of apparatus like *Ḍamaru yantra, Sikatā yantra* (sand-bath) and *mūsa* (crucible). For incineration or prolonged heating, of mercury a contrivance called *Lāvaka puṭa* (see p. 280) is advised. The *Rasaratnasamuccaya* gives eight methods for the preparation of mercurial ash or *bhasma*.

Method of using rasabhasma

In tune with certain religious medical injunctions, there is also a prescription regarding the use of *rasabhasma*. One should first pay obeisance to the preceptor of mercurial preparations, worship the mercurial medicament stored in a conch shell or bamboo and also the deity as well as a cow, with devotion. Thereafter, one should place a small

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quantity of the mercurial preparation in a betel leaf and consume it followed by a suitable adjuvant (*anupāna*).

As noted before for obtaining incinerated ash-fine powder (*bhasma*), the process is called *māraṇa* or ash-making. It is important to note that, in this process, mercury, even at mild temperature, goes out as vapours, hence it has to be first subjected to a process called '*jāraṇa*' with substances like mica, sulphur, and others. Since this method is rather cumbersome, at present the red sulphide of mercury (*rasasindūra*) is in use instead of the ash form of solidified mercury.

In mercurial therapy, dietary regimen (*pathya*) is very important. Such a regimen includes the use of wheat, red variety of rice (cooked) a compatible food preparation along with clarified butter(ghee), rock salt, cumin and ginger. Further, leafy vegetables like *Amaranthus spionoses Linn* (*taṇḍulīyaka*), coriander, *Tricosanthes dioica Roxb (paṭola), Lageneris bullgaris, Ser* (*alābukar*) and others. Cow's milk, clarified butter and curd, extract of green gram and a special variety of water (*haṃsodaka*) are recommended as the dietary regimen. Food stuffs, which are to be avoided during the mercurial therapy, include those which are heavy, constipating and irritating as well as hot ones. One should also not eat food on a plantain leaf, or in bronze plates. In addition, fasting, the use of perfumed oil bath, consuming intoxicating alcoholic drinks, fermented acidic or medicated liquors, the meat of animals of marshy places and the like are prohibited. The *rasaśāstra* texts emphasise that not only the mercurial compounds should be prepared in a systematic manner, but also their internal use should be strictly in accordance with the prescribed dietary regimen. Such methodical observance will lead to positive therapeutic results, while their non-observance will result in disastrous consequences.

MEDICINAL ASPECTS OF THE RASAŚĀSTRA

As stated earlier, the concept behind the preparation of mercurial and allied drug compositions is to prevent the ageing process and to maintain the body in a healthy and virile state. Most of these compositions contain the systematically processed mercury, sulphur, and other elaborately processed minerals and metals specially gold and silver, gems, and several chosen plant products. The point worthy of note is that though all of these, either singly or in combination, are toxic in their native states, they are rendered into useful drug compositions by methodical and systematic processing. Recent experimental studies on animals have revealed that not a few of such drugs have acquired their therapeutic efficacy as a result of the methods followed by the *rasavaidyās* or Ayurvedic practitioners as prescribed by the *rasaśāstra* texts, though there have been some modifications here and there. Further, it has been noticed that the intake of these traditional drugs in proper doses and with the prescribed dietary regimen would improve the bodily immunity system and resistance power. In Ayurvedic parlance, these drugs are found to bring about a proper balance among the body humours and thus cure certain diseases which, according to Ayurveda, manifest themselves because of the humours vitiated from their normal balanced states in the body.

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Generally, for therapeutic administration, the proven drugs are employed in the form of incinerated ash-fine powders (*bhasmas*) which are the resultant products of careful processing and prolonged heating (*puṭapāka*). These fine powders are in the nature of metallic oxides or sulphides, except that of gold which is associated with fine particles of activated carbon, as evidenced by metallographic studies. It has been shown that the meticulously prepared gold *bhasma,* either as it is or with a suitable adjuvant, or in combination with compatible drugs, is one of the best anti-toxic and health invigorative agents. The other types of *bhasmas* or compounds employed for medicinal purposes include the ones prepared from mica, iron pyrites, bitumen, sulphur, red ochre, alum, arsenic sulphides, lead sulphide, lead monoxide and, above all, cinnabar or mercuric sulphide. Besides, the *bhasma* or what is called the *piṣṭi* forms of precious stones like ruby, pearl, coral, emerald, topaz, diamond, sapphire, hessonite or cat's eye are also used, after subjecting each of them to an intensive systematic processing.

Calcium compounds also find their use in therapy. The methods of their preparation have been described in the *rasaśāstra* texts, laying emphasis on the need to remove their caustic nature. It may be noted that precious materials like coral and pearl are also made of calcium compounds, besides conch shells, cowrie, and other marine products. These are transformed into their *piṣṭi* form after purifying and subjecting them to fine grinding with specified liquids and the resultant *piṣṭi* forms are recommended for therapeutic purposes excepting diamond in which case its *bhasma* form is preferred.

It may be reiterated that the main objective of the mercurial and other metallic and mineral drugs, as extolled in the *rasaśāstra* texts, is concerned with the rejuvenation and virilization of the human body, improvement of internal resistance, and the promotion of health, thus prolonging the ageing process.

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CHAPTER 10

Unani Medicine in India: Its Origin and Fundamental Concepts

Syed Zillur Rahman

As we study the earliest civilizations and primitive religions, it becomes apparent that medical philosophy originated not as a science, but as a belief that it was the gift of God or of gods. The primitive religions resulted from early man's ignorance, fears and a sense of reverence. Whenever some unexplainable natural phenomenon overcame man, he sought to increase the number of his gods in the hope of solving his problems. In the same way, he tried to cure his patients by appeasing gods.

Five thousand years before Christ, according to the Papyrus of George Ebers, medicine, surgery and even dentistry were practiced in Egypt. Kings, emperors, scholars, poets, philosophers and priests were among those who studied and followed the healing art. Moses (c.1200 B.C.) was born and brought up in the civilised atmosphere of ancient Egypt. He gave to his people the laws of life and health which are good even today. His philosophy was to prevent disease, follow the laws of sanitation and allow nature to do the healing.

Historical

In order to understand the origin of Unani Medicine, it is desirable to have an insight into the history of medicine, beginning with the Greeks. The Greek system of medicine was formulated when the Greeks were at the zenith of their glory intellectually and morally around 600 to 300 B.C. It was during this period that an attempt was made to preserve it by writing the knowledge that had been buried in the memories of the sages for ages. It was again during this period that the idea of medical institutions was born and the foundation of hospital laid. The Greek scholars made successful attempts at systematizing the knowledge regarding the process of healing. It was also in this era that much of the divine power of healing possessed by the religious head and priest, became the property of common man. Although the priesthood was not abolished, it came to be recognized by

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all the clever and learned men who were outside the rank of the priest- a fact hitherto unimaginable. Pupils flocked to them to share worldly and material knowledge, while for satisfying their spiritual hunger they sought the help of the priests who were still recognised as the spiritual leaders, offering a medium between man and god. The priesthood of the Greeks deserves mention in this regard, because it did not despise any revolutionary trend. History has not recorded massive protest lodged or non-cooperation staged by priests as a class during this transitional phase. Enlightened religious leaders did not mind their students flocking to the more materialistic philosophers, which obviously resulted in minimising their erstwhile importance and diluting very much the hold that they had on the people. Instead, they were probably happy to see that their burden was lightened. Perhaps they encouraged their progeny to learn from the materialistic philosophers and drink the fountain of their knowledge. Excepting the Greek priests, nowhere else has such a smooth delegation of power been voluntarily given up by the 'divine' class as a whole without protest or bloodshed.

In retrospect, it is evident that the Greek priestly order was less conservative in its thinking, with the result that the modern scientific world still pays homage to them by adopting the emblem of the Greek god of Medicine, Aesculapius. His staff and coiling serpents still remain the recognised symbol of modern curative medicine. On the preventive side, the pretty Greek goddess, Hygeia, is still honoured, and the preventive branch of modern medicine or hygiene feels proud of being known after her name. It is just as in the field of sports, god Zeus of Thessaly is still remembered in the national and international Olympic meets, and the traditional Olympic torch is lit at his mountainous abode, the Olympus, in the rugged Greece with a sacred ceremony and devotion that often excels the rituals originally observed by the Greeks themselves. This, again, is a tribute to the open-minded approach of the Greek philosophers who gave official sanction to sports and physical training as willingly as they had done in the case of medical knowledge, where all and sundry were welcome to share it with them. With this broad-based patronage, the system of healing which originated in Greece, percolated well beyond the geographical boundaries of its homeland into the vast Greek Empire, including Asia Minor and North Africa which, in course of time, became the stronghold of the system (Zaidi (1963), pp. 10-11).

Aesculapius, a pupil of Chiron, who introduced the art of medicine from Egypt into Greece around 1300 B.C., believed in physical training, the use of water, and a wholesome diet along with incantations and magic that were customarily used to treat the sick. He had two sons, both physicians, and the fact that one of them, Machaon, in treating the wound, sucked out the poison with his mouth, indicated that magic alone was not considered enough. From Aesculapius and his sons, medicine passed into the hands of the priests wherein, it remained dormant for several centuries.

Thales (639-546 B.C.) of Miletus in Asia Minor, having returned from Egypt where he studied under the priests, pursued his investigations which laid the foundations of geometry, astronomy, physics and philosophy. He succeeded in destroying many unfounded myths and superstitions concerning the 'gods of healing' and taught that natural conditions, not demons or spirits, would cause diseases. From the time mankind

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ceased to search the heavens for the cause of nature, it was not long before several thinkers began to explore the laws of nature. Thus, in the fifth century, B.C., mankind 'turned from the supernatural in its search for the cause of disease, and sought it where it really is-in nature, in the working of body, in the earthly surroundings of man' (Haggard). This new idea, with rational philosophy, which sprang from the Ionian school, later spread to Athens. In this respect, the Ionian philosopher, Anaxagoras of Clzomane (500-428 B.C) deserves special mention. He is reported to have brought the Ionian doctrines to Athens during the era of Pericles, whose teacher he was. He explained the occurrence of eclipse to Pericles on natural grounds, predicted the eclipse on May 28, 585 B.C. and claimed that the earth is round, that the Sun, Moon, and Stars, were developed at the center of the earth during a violent eruption, and that the 'mind' was the cause of motion among the elements. Arrested and tried for the crime of denying the importance of the Athenian gods in all these phenomena, Anaxagoras was compelled to leave Athens. Yet his teachings were not readily forgotten, and the great Athenian philosophers—Pythagoras, Socrates, Plato and Aristotle—were to enter the scene and continue those investigations. Thales succeeded in destroying many unfounded myths and superstitions concerning the 'gods of healing' and taught that natural conditions, not demons or spirits, would cause disease.

Pythagoras, probably, the first to call himself a philosopher, was born in Samos (Greece) about 600 B.C.. Though essentially being a mathematician, he became interested in medicine and demonstrated that to be a philosopher, one must also be a physician. He established a school in Crotona, in southern Italy, dissected bodies of animals and studied physiology. Thus he originated the Italian school of philosophers who were interested in mathematics, ethics and other branches of philosophy as well as in medicine and politics. He taught also that there was mystical number cure, a theory which he must have borrowed from his travels in Egypt. Four was regarded as the square of the first even number, symbolizing the perfection of the eternal changes in nature, and ten as the perfect number. Pythagoras was perhaps the first to suggest that the brain was the centre of thought and mental activity—an idea confirmed by Hippocrates and Galen—although Aristotle denied it. Pythagoras also studied mathematics and physics of different degrees of pitch and he was thus the first to construct a musical scale. Without adding much to the knowledge of medicine, Pythagoras and his illustrious pupil, Empedocles, retrieved to some extent medicine from the grasp of superstitions that had held it so closely during the previous centuries and thus paved the way for Hippocrates.

Hippocrates

In ancient Greece, there flourished two schools of medicines, the older one at Cnidus and the younger one at Cos. At Cnidus, stress was laid on accurate description and distinction of diseases and too much emphasis was given to subjective symptoms and little attention was paid to objective science. The school of Cnidus viewed the pathology of each organ separately and treated it locally. On the other hand, the members of the school of Cos paid more attention to objective symptoms and did not rely too heavily upon the

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statements of the patient. They worked inductively in the school of Cos to which Hippocrates, the 'Father of Medicine' also belonged.

Hippocrates (b. 460 B.C.), who brought reason to the aid of observation, studied his cases and carefully recorded all natural happenings. He was also a great surgeon and it is probable that he dissected animals. His greatest contribution was, however, his separation of medicine from magic and religion, believing that all diseases were due to natural causes. He also separated medicine from philosophy which had begun to dominate it during his time following the speculations of Greek philosopher-physicians, in order to strengthen its foundation on observation and experiment. He was the first physician and the only one on record in antiquity, who introduced the method of taking down medical histories. He spared no efforts in finding out the natural causes of disease, in the earthly surroundings of man and in the mechanism of his body. After the death of Hippocrates, medicine came to a standstill, as is frequently the case after the death of a pioneer far ahead of his time. His two sons, Draco and Thessalus, and his son-in-law, Polybus, formed a society, called *Dogmatic* and founded a school of medicine with the same name which, far from following the principles of Hippocrates, was organised with the understanding that no additional knowledge was required and that no changes were acceptable—an attitude with the sole idea of preserving Hippocratic medicine.

Post-Hippocratic medical philosophy and practices resulted in the development of four classes of medical practitioners: the *Dogmatists*; the *Emorics*, who discarded all theories of science and philosophy which were already accepted; but relied solely on their own observations and experiments; *Methodists* who believed in innumerable body—atoms and pores and in the doctrine of *strictum et laxum* or of tension and relaxation as the cause of disease; and lastly *Ecletic* which, as the name suggests, was founded on the principle of selecting those doctrines of other sects that seemed to them the most reliable and sensible.

Aristotle

Barely a hundred years after the birth of Hippocrates in the glorious atmosphere of classical Greece, was another physician who lived in memory for about twenty centuries and was to give a new direction to medical philosophy, apart from his metaphysics and biology. His name was Aristotle. He wrote the first account of anatomy, made valuable contributions to physiology and brought back the inductive mode of reasoning, which the *Dogmatists* had almost erased from their thoughts. In the philosophy of Aristotle a new term, *psyche*, is used which means to think and know, i.e. the conscious intellection, as distinguished from unconscious intelligence, both essentially existing together. Medicine has greatly profited by the development of the principles of these two human internal forces.

After the downfall of the Greeks, the Romans who came to power, easily over-ran the Greek mainland, but it took them several years to reach North Africa where the medical school of Alexandria was still flourishing in spite of the collapse of the Greeks at home. It was only after a long-drawn battle that the last queen of Egypt, Cleopatra, was

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captured and taken prisoner (50 B.C). The Romans did not live long afterwards to enjoy the fruits of their plunder in Egypt. History is silent on the impact of that change of hands in Egypt, i.e. on the medical school of Alexandria. However, it is a historical fact that the school lost much of its glory and gradually went down hill to the point of extinction around the year 200 A.D. Its glorious existence for about five centuries, a record existence for any institution at that time, shows how popular that institution was and it was there that the sciences of anatomy and physiology were born (Zaidi, 1963. p14).

The profession of medicine then was beneath the dignity of a Roman citizen, who cured himself by invoking the aid of gods in place of physician; there were no physicians in Rome before the arrival of the Greek, Archagathus. The first Greek physicians were slaves of Roman families and prejudice against them lasted until the Christian era. About the middle of the first century before Christ, during the reign of Ptolemy Physkon, all the Greek scholars were expelled from Alexandria (Aziz , 1961. P.S).

As the pre-Christian era drew to a close, a Greek physician, Archgathus, brought the art of medicine to Rome, which in turn was not yet ready for Greek philosophy and medicine. Its artists were devoted to the art that imitated nature, bees, flowers and birds, and its scientists and philosophers seemed obsessed with the desire to seek knowledge only of rhetoric and geography. When the Macedonian Library was taken to Rome and the gates were opened to Greek learning, many opponents appeared to fight its influence. One of them was Marcus Cato, who still believed in the superiority of Roman culture. In course of time, they absorbed Greek thoughts and culture, but they imbibed very little that was new in medicine and philosophy. Pliny the Elder however, wrote his famous book *Natural History,* which is a storehouse of science in general, and of medicine in particular.

Galen

Galen, the most illustrious man in the history of medicine gathered all the medical knowledge of his time, arranged it systematically and on such firm basis that it continued to be authoritative for the next fifteen centuries. He was born in Pergamum (Asia Minor) in 131 A.D. After completing his education, he went to Rome where he acquired everlasting fame. The writings of some historians indicate that his ability as physician lay not so much in his treatment as in his personality and common sense and in the inspiration he brought to bear upon his patients. However, Galen himself realised the value of philosophy for medicine and spared no efforts in aiming at the two. His word became the law of medicine for more than fifteen hundred years and few, if any, had the courage to dispute his doctrines. He is even now acknowledged as the undisputed medical leader and philosopher of his time.

The contribution of Galen to medicine rate only next to those of Hippocrates. He preached his doctrines for nearly forty years. Confirming the hypothesis put forward by Aristotle and Hippocrates, Galen devoted himself to medical studies particularly anatomy. He studied the function of muscles and joints and explained how the combination would help in locomotion. He also studied viscera and described their functions. He published

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his works in the form of books and monographs. Galen found in the *Pneuma,* the essential principle that maintained organic equilibrium. He classified the pulse into sixty separate varieties and emphasised the relation between the soul and the body, and the power of mind over the body. Galen, like Aristotle, also believed in the four humours, closely correlated them with the four elements of which the universe was constituted. Galen thought that all temperaments were mixtures of various grades of these four basic humours: namely blood, phlegm, yellow bile and black bile, (Zaidi 1963, p.16)

After the collapse of Graeco-Roman civilization, the vast Arabic-speaking world of the Middle Ages rendered great service to the mankind by its scientific and medical achievements. Greek knowledge passed from Byzantium to the lslamic world through the Nestorian Greeks, a sect of Christians, Nestorius being heir patriarch at Constantinople in 428 A.D. They were compelled by the Emperor Justinian (483-565) to leave their homes in Bysantium and Nestorius died in exile in Egypt in 440 A.D. The Nestorians, however, founded a medical school which attained great importance towards the end of the fifth century. The Christians of the Orient naturally brought Greek civilisation with them. They translated their Greek books into the Syriac language and their schools had many noted graduates, among whom we may mention Hunayn and Mesue. They were joined by other famous refugees, the last pagan philosophers of the Platonic school of Athens. They practised both medicine and theology, and their medical school at Edessa, which was destroyed by an order of Emperor Zeno in 489 A.D. had attained great fame. They were welcome also in Persia where they established friendly relations with Zoroastrian scholars and founded a medical school which conducted courses in theology, sciences and medicine. This school became the meeting place of the East and the West. As the Muslim influence rose in Persia and the Middle East, more and more Greek and Latin books were translated into Arabic.

Daper writes: 'In less than a century after the death of Prophet Muhammad, the *Iliad,* the *Odyssey*, and the works of philosophic authors, had been translated into Arabic. Schools of medicine, law and astronomy were established in Baghdad, and during the ninth century, when Christian Europe was dull and stupid with its superstition and ignorance, the Muslim Kingdoms were busy collecting great libraries, establishing schools in connection with every Mosque, originating the systematic study of natural sciences, particularly geometry, algebra, optics and chemistry'. Thus while Europe floundered in the darkness of the Middle Ages, Islamic culture, the then beacon light of humanity, spread throughout the countries of the Near East and into the Western Caliphate, of which Cordova (Spain) was the centre. The Muslims were teachers of the world, and they did their part to stimulate the first signs of revival in the countries of Europe that had so long been dormant. Unani Medicine may be defined as that system of Greek medicine which was developed during Arab civilisation, and called Unani (Ionian) or Greek medicine, thus gratefully acknowledging its origin.

We must give due weight to the Umayyad Prince Khalid b. Yazid in Damascus for the well-authenticated Arabic translations of Greek works on alchemy; and must admit the possibility, if not the probability, that such translations included other subjects as well, namely, philosophical, medical and the like. Be that as it may, it was in the middle of the eighth century and through the then newly founded city of Baghdad that the great stream

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of Greek and other ancient learning began to pour into the Arab world and to reappear in an Arabian disguise. So far as medicine is concerned, the tradition of the old Sasanian school of Jundishpur in Persia was predominant.

The school of Jundishpur at the time of Prophet Muhammad's birth was at the height of its glory. There, the Greek and Oriental learning were amalgamated. The former transmitted in part directly by the Greek schools, but for the most part by the industrious and assimilative Syrians who made up by their diligence what they lacked in originality. Sergius of Ra'su'l-'Ayn, who flourished a little before that time, was one of those who translated the works of Hippocrates and Galen into Syriac. From this intermediate Syriac medical literature, many, perhaps most of the Arabic translations of the eighth and ninth centuries, were made. (Browne, 1921. p 21)

Translations

Between 750 and 900 A.D., a substantial amount of money was spent by Arabs in the purchase and translation of Greek manuscripts. The Nestorian family of Bakhtishu was renowned for its physicians. Jurjis, the first physician of this family, was the head of Jundishpur Hospital and, in 765 A.D, was received with royal honours by Caliph al-Manṣur in Baghdad. Ḥunayn b. Isḥaq (809-837) of Hira was a celebrated translator of Greek medical works into Arabic; he had a great passion for knowledge. He went away from Baghdad for several years to learn Greek. He was the most productive among the other translators. Of the ten Hippocratic writings mentioned by Ibn Nadim, the author of the *Al-Fihrisṭ,* that existing in Arabic translations in his time, seven were his translations and three; those, of his pupil, 'Isa b. Yaḥya, while the "sixteen books" of Galen were all his translations or his pupil Ḥubaysh. We learn from the *Al-Fihrisṭ* that Ḥunayn translated the works of Greek into Syriac, while Ḥubysh translated those from Syriac into Arabic; the Arabic version was then revised by Ḥunayn who, however, sometimes translated the texts also directly from Greek into Arabic.

Another group of translators of Greek works into Arabic was provided by the city of Harran, which remained pagan down to the thirteenth century and was the bearer to a high degree of Greek culture for a long time, specially, at Hellenopolis. Of the learned Harranians, the most noted were Thabit and Ibrahim, and his great-grandson Sinan, and the family of Zahrun. There was another contemporary translator, Qusṭa b. Luqa (d. 923) of Balbek in Syria. Ibn Masawayh was also a representative of the translation period of Arabic medicine. Thus, among the tenth century Muslims, irrespective of race, Arabic was not only the language of their revealed religion, Islam, but also of science and medicine. Of the Greek medical writers, besides Hippocrates and Galen, their favourites were Rufus of Ephesus, Oribasius, Paul of Aegina, Alexander of Tralles; and, for materia medica, Dioscorides. It is worthy of note that some Greek writings lost in the original, have been thus preserved in Arabic translation. (Browne, 1921; p.28)

We must now pass on to the independent Arabic writers on medicine, who, starting from this foundation, compiled more original works embodying observation of their own, and arrange them in their own way. The translation period lasted 100 years (750 and

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850). The oldest original medical writers of them is Ali b. Raban Ṭabari. According to the *Al-Fihrist*, he wrote only four books, of which the *Firdaus Al-Hikmah* is the most important.

Al-Razi

During this period of Arabic enlightenment, certain schools came into prominence. Abu Bakr Muhammad b. Zakariya Razi (850-923) was a physician; teacher, alchemist, philosopher, mathematician and astronomer as well. He was the greatest and the most original of all the Muslim physicians and one of the most prolific authors on medical subjects. He has left behind about two hundred treatises dealing with several topics of medicine. In his most important work in Arabic, *Al-Ḥawi*, he explained the theories held by all philosophers and physicians of his times. It has been generally recognised by all authorities of medicine that, as a clinical observer, *Al-Razi* excelled all his compeers. And since the clinical notes of old Arabian physicians are of much greater interest and importance than their knowledge about physiology, pathology and anatomy, a careful study of the works of Al-Razi, especially of his magnum opus, *Al-Ḥawi*, is probably the most rewarding to historians of Arab Medicine. The historian Ibn Abi Uṣaybi'a says: 'There are many accounts and various valuable observations by Al-Razi as to what he achieved by his skill in the art of medicine, his unique attainments in the healing of the sick, his deduction of their condition through his skill in prognosis, and the information which he gave as to their system and treatment, unto the like of which but few physicians had attained in his time. He has many narratives of what fell within his experience in these and like matters, which are contained in many of his works' (Ibn Abi Uṣybi'a 1882; p.309).

Of his many monographs, the most celebrated in Europe is his well-known *Treatise on Smallpox and Measles, in* which an account of his observations on these diseases is given. It was first published in Arabic with a Latin translation, and later its English and Persian versions were also published. Another monograph by Al-Razi on stone in the bladder and kidneys has been published in Arabic (original), with a French translation. Of the general works on medicine, a few selected monographs are: *Al Jam'i, Al-Kafi, Al-Madkhal, Al-Muluki, Al-fākhir* and *Al-Manṣoori,* etc. *al-Razi* was original in his belief that fever in itself was not a disease but a natural means for combating infection. Herein he stands in sharp contrast with Ibn Sina; for, the latter was a better philosopher than physician, while *Aal-Razi*, a better physician than philosopher. His interest in medicine was aroused, when he was of mature age, by visits to the hospitals and conversations with an old druggist who served there. Of the hospital at Ray (Iran), he ultimately became chief Physician, and he attended it regularly, surrounded by his pupils and the pupils of his pupils. Every patient, who presented himself, was first examined by clinical clerks, as they used to be called, and if the case proved too difficult for them it was passed on to the master's immediate pupils, and finally, if necessary, to the master himself. Subsequently, Aal-Razi became physician-in-chief of the great hospital in Baghdad, about the foundation of which he is said to have been consulted. Being asked to select the most suitable site, he is said to have caused pieces of meat to hang up in different quarters of

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the city, and to have chosen the place where they were the slowest in showing signs of decomposition (Browne 1921; p.45).

Al-Majusi

'Ali b. 'Ābbas Majusi (d.994), an accomplished physician, studied with Abu Mahir Musa b. Sayyar as well as worked and acquainted himself with the ancient medical texts. He composed for the king 'Aḍudu'd-Dawla, his system of medicine entitled *Al-Maliki or Kamil al-San' at al-Ṭibbiya,* which is a splendid work and an admirably arranged thesaurus encompassing the science and practice of medicine. It enjoyed great popularity in its day and was diligently studied, until the appearance of Ibn Sina's *Qanun* which usurped its popularity and caused the *Maliki* to be somewhat neglected. The latter excels on the practical, while the former on the scientific side. Al-Majusi flourished in the latter half of the tenth century and his work, the *Maliki* is the most accessible and readable of the great system of medicine, since an excellent edition of this text in two volumes was printed in Cairo in 1877, and later its Latin and Urdu versions were also published. The Arabic text comprises some 400,000 words, and is divided into 20 *Discourses*, each subdivided into numerous chapters, of which the first ten deal with the theory, and the second ten with the practice of medicine. The second and the third of these *Discourses* deal with anatomy and the nineteenth *Discourse* containing one hundred and ten chapters, is devoted entirely to surgery (Browne 1921; p.65). One of the greatest contributions 'Ali b. Ābbas made to medical science was his descriptions of the capillary circulations which he presented in his book. He gives accurate directions for catheterization of the urinary bladder in male patients for removing cyst and tuberculous glands.

It may be interesting to point out one aspect namely the fees earned by one of the most eminent physicians (under the early 'Abbasid Caliphs), Jibra'il b. Bukht Yishú, who died around 830 A.D. According to Al-Qifti, he received out of the public funds monthly salary of 10,000 *dirhams*, and from the Privy Purse 50,000 *dirhams* at the beginning of each year, besides clothes of the value of 10,000 *dirhams*. For treating the Caliph Harun Al Rashid twice a year, he was paid 10,000 *dirhams,* and an equal sum for administrating biennial purgative draught. From the nobles of the Court, he received in cash and kind 400,000 *dirhams* a year, and from the great Barmecide family 1,400,000 *dirhams* (Al-Qifti, 1908, p.100).

According to Al-Qifti's computation, the total amount which Jibrail received for his medical services, apart from what he earned privately from lesser patients, during his twenty-three years' service of Harun al-Rashid and his 13 years' service of the Barmecides, amounted to 88,800,000 *dirhams,* a sum equivalent, if we except Von Kremer's estimate of the *dirhams as* roughly equivalent to a franc, to more than 17,500,000 pounds sterling.

Ibn Sina

Ibn Sina (980-1037), generally acclaimed as al-Shaykh al-Rais, the 'Chief Master', or al-Muâllim al-Thani, 'the Second Teacher', after Aristotle, was born in Bukhara. He was a

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great philosopher, physician, poet and a man of public affairs. At the age of sixteen, he had mastered arithmetic, algebra, geometry of Euclid, and studied the celebrated works on astronomy, and memorised Holy Quran. Not satisfied with this learning he turned to medicine and became one of the leading physicians of his time. When he was not even eighteen years old, his reputation as a physician was such that he was summoned to attend the Samani ruler Nuḥ b. Manṣur (reigned 976-997) who, in gratitude for his services, allowed him to make free use of the royal library which contained many rare and unique books.

Ibn Sina wrote the encyclopedia of medical knowledge, *Al-Qanun* (The Canon of Medicine). An attempt to reconcile the doctrines of Galen and Aristotle, this remained as a standard medical work for several centuries in Europe, and was used as a text book till 1650. There is an Egyptian edition of the Arabic text, besides a Latin edition of 1593; and a good Venetian translation into Latin was published in 1544 and an Arabic edited text with English translation by Hakim 'Abdul Hameed of Jamia Hamdard New Delhi. *Al-Qanun* contains not less than a million words and, like most Arabic books, is elaborately divided and subdivided. Its main division is into five books, of which the *First* deals with general principles; the *Second* simple drugs arranged alphabetically; the *Third*, deals with the head to the feet; the *Fourth*, with diseases which, though local and partial in their inception, tend to spread to the other parts of the body, such as fevers; and the *Fifth*, with compound drugs. These descriptions are in fact very inadequate. Book Four discusses not only fevers, but of their critical days, prognosis, tumours and ulcers, dislocation and toxicology.

Its encyclopedic character, systematic arrangement, philosophical concepts, perhaps even its dogmatism, combined with immense reputation of its author in other fields besides medicine, raised *Al-Qanun* to a unique position in the medical literature, so that the earlier works of Al-Razi and Al-Majusi, despite their undoubted merits, were practically abrogated by it.

Al-Qanun is still regarded in the Indian subcontinent by the followers of old Greek Medicine, or the *Tibbi Unani,* as the last appeal in respect of all matters connected with the healing art. The author of *Chahar Maqāla* says 'that if a physician desires to be independent of all other works, he may rest satisfied with the *Qanun*'. Ibn Sina wrote some books in the form of verse. Of his prose works, after the great *Qanun,* is the treatise on cardiac drugs, which was translated into Latin, English, French, Persian and Urdu. Its Persian version of Hakim Aḥmadullah was edited in 1996 by the author of this chapter. Ibn Sina has also described the contagious character of phthises, diagnosed ankylostomiasis, wrote on the effects and treatments of various forms of poisoning; e.g., those taking by way of mouth and those from bites of insects and by animals.

Ibn Sina died in 1037 at the comparatively early age of 58. In his last illness, he treated himself unsuccessfully, so that it was said by his detractors that neither could his medicine save his body nor his metaphysic, his soul.

The Canon of Medicine is a comprehensive and yet concise account of medicine of his time. This work does not differ in essentials from those of Ibn Sina's forerunners al-Razi and 'Ali Ibn-'Abbas (d.944), both of whom presented the doctrines of Hippocrates, modified by Aristotle, and later by Galen. *The Canon of Medicine,* however, emerged as

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more logical and systematic than any other medical treatise of that age. It contains references to the works of earlier physicians, supplemented and modified by personal observations and conclusions of Ibn Sina himself.

The Canon defines Medicine—*Tibb*—as a branch of knowledge, and not as some dogma or superstition. It derives its knowledge of organs and functions from 'observation and analysis'. It infers causes, symptoms, prevention and treatment of diseases by logical reasoning and explains them rationally to the fullest extent in both space and time. It has certain concepts derived from the science and philosophy of ancient times.

Another well known medical man, 'Ali b. 'Isa wrote a treatise entitled, *Taḍkira al-Kuhḥālin* on ophthalmology, which was classic in that time. In this work, he has summarized the knowledge of ophthalmology which was learnt from the Greeks and added much that was original with the Arabs. The credit goes to Abu 'Ali al-Hassan b. Haitham (al-Hazen; b.965), who was one of the greatest in optics and who disagreed with his contemporaries and explained that in vision, the rays passed from the object to the eyes and not from the eye to the object.

In the development of Arabian medicine in the wider sense or, in other words, in the adaptation of ancient Greek medicine to the Islamic civilisation and the general system of science eclectically built up by Muslim scholars and thinkers during the 'Golden Prime' of the Caliphate of Baghdad (from the middle of the 8th century onwards), there are two distinct periods: that of the translations into Arabic of the masterpieces of Greek medical literature, which were destined to form the base for further studies, and that of the independent and original writing.

It is necessary to mention here that a flourishing civilization emerged in Spain and the West under Arab dominion. The most illustrious names associated with medicine in Muslim Spain are very important in the history of Unani medicine. In the tenth century, Spain produced the greatest surgeon of the Arab world, Abul-Qasim al-Zahrāwi, known to medieval Europe as Abulcasis or Alsaharavius. (d.1013). His surgical book, *Al-Taṣrif*, includes many illustrations of instruments used by Arab surgeons. His works succinctly describe operative techniques that had been hitherto unknown in medical science, and his comments as well as his accounts of personal experience prove that he was an excellent surgeon. He described operative surgery. He is said to be the first to advise ligature of arteries, which he did long before Pare; he is believed to be the first to use hooks for extracting polyps, teach the method of vaginal lithotrity, describe hemorrhagic diathesis, and to write on orthodontia. He performed transfer tracheomy and distinguished between cancer of thyroid and ordinary goitre. The court physician, Ibn JulJul, Ibn Wafid and Ibnu'l-jazzar of Qayruwan in Tunisia, were his contemporaries.

Ibn Zuhr or Avenzoar (1090-1162), was born in Seville, Spain. As a clinical observer, he was placed next to Razi. His book, *The Teissir,* is a collection of interesting cases and its Urdu translation was published by the Central Council for Research in Unani Medicine (CCRUM), New Delhi, in 1986. Among his brilliant pupils was, Ibn Rushd, Averroes (1126-1198), born in Cordova, a famous philosopher and physician but known as the 'Prince of Philosophy'. He wrote a book called *Colliget*, which was very valuable to philosophers and physicians alike.

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Another Spanish philosopher and physician, Ibn Maimun, known as Maimonides (1135-1204), was born in Cordova. He went to Morocco and later to Egypt, where he became a physician in the court of Ṣalah ud Din, the Sultan of Egypt. He wrote a treatise entitled *Fusul Musa* on medical principles, in which he attempted to reconcile both faith and reason, or the *Torah* and science. Like Moses, he wrote on hygiene, and his book *Mishma Torah* contains valuable hygienic advice. He also wrote on preventive medicine in which he strongly believed.

Averroes or Ibn Rushd wrote in Arabic, a book on basic principles of Unani medicine, *'Kitab al Kulliyat'*, which was published by CCRUM in 1984, and its Urdu translation in 1980. Another important name of the thirteenth century was the great botanist, Ibn al-Baytar, (1147-1248) of Malaga, a worthy successor of Dioscorides. He travelled widely through Greece, Asia Minor and Egypt in search of medicinal herbs, and his work on materia medica, *Al-jani' al-mufradāt, al-Advia wa al-Aghziya*, was available in Europe in Sontheimer and Leclerc. Its Urdu translation has been published by CCRUM (Central Council of Research in Unani Medicine).

In the transmission of the Arabian system of medicine to Europe, Spain and North-West Africa played a pivotal role; and in the transmission to Indian subcontinent, the Eastern Caliphate of Baghdad had an important role. Arabic was the chief vehicle of theological, philosophical and medical thought throughout the land of Islam, as Latin was in Medieval Europe which was hitherto used almost exclusively for the translation of the works of Persian physicians, Razi, 'Ali Ibn 'Abbas Abu Sahl and Ibn Sina. But in the early part of the twelfth century, there came to the court of Khwarazm or Khiva, a physician named Zain al-Din Ism'al Jurjani who wrote several medical works of which the most important and by far the largest is entitled, in honour of the ruler to whom it was dedicated, *Dhakhirah-i Khwarazm Shahi.* This work which rivals, even if it does not exceed in scope and size, *Al Qanun* of Ibn Sina, was translated into Urdu and published from Lucknow. This encyclopedic work comprises 450,000 words. The same author composed several but smaller medical works, all in Persian, namely, the *Aghraḍ-al Tibb, Yadgar* on materia medica and pharmacy, and the *khuff-i-'Alai* written in two elongated volumes to be carried by a traveler, one each in his riding -boots (*khuff*), hence its name.

One of the most learned men and scholarly writers of that period was the physician, Rashid al-din Faḍlu'llah, born in 1247 at Hamadan. He became a court physician to the Mongol ruler, Abaqa, whose successor Ghāzān, a convert to Islam, formed such a high opinion of him that he appointed him Prime Minister in 1295. During his twenty two years of this exalted but perilous post, he enjoyed enormous wealth and power which he used in the most beneficent manner for the foundation of colleges, hospitals, and libraries, endowments for learning, and encouragement of scholars. On the beautiful institution which he founded at Tabriz and named after himself, *Rub-í Rashidi*, he lavished endless care not only for adorning it with noble buildings consecrated to the pious and the learned, but also drawing into its fold the greatest scholars, most eminent professional men, and skillful artisans of the time from all parts of the world. The extraordinary and minute precautions which he took to perpetuate and diffuse the learning stored in the incomparable libraries of the *Rub-í Rashidi* are fully detailed by Quatremere in the introduction to his *Historie des Mongols* (Browne 1921, p.103).

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It may be noted that the Arabs made three fundamental contributions to medicine: medicinal chemistry in the form of alchemy as well as botanical knowledge; organisation of pharmacy; and the founding of hospitals. Arab physicians and pharmacists were pioneers in chemistry and pharmacology; they did extensive experimentation which led to the development of several fundamental chemical processes such as filtration, distillation, sublimation, and calcination. Gebar distilled vinegar, sublimed sulphur, prepared sulphuric as well as nitric acids and mercuric bichloride. Ibn Sina had attained the capability of deducing the pharmacological properties of drugs from their taste, colour and odour. The Arabs experimented with their drugs on animals. Razi tried mercury on monkeys. To Arabs then belongs the credit of having created medicinal chemistry later to be reintroduced by Paracelsus.

The supervision of the pharmaceutical trade was also devised by Arabs. Their pharmacies were supervised by inspectors who threatened the pharmacists with bodily punishment if they adulterated their drugs. They founded magnificent hospitals such as the Manṣur Hospital in Cairo. This hospital had separate wards for men and women, for general diseases, and for eye diseases. For patients with fevers, it boasted of wards decorated with fountains so that the patient might be soothed by the 'chanting' water (Aziz 1961, p.7).

Jundishapur in Persia had a flourishing medical school and Muslim Caliphs invited professors of medicine from this school to work in Damascus and Baghdad. Under Muslim patronage, the Graeco-Arab medicine was enriched with the Indian, Chinese and Persian medical knowledge to a high degree. The Arabic form of Greek medicine was brought to the Indian sub-continent in the time of Muslim rulers, and it has particularly found its home here providing medical aid to a large section of the population of this vast sub-continent.

Fundamental Concepts, Definition And Scope of Medicine

According to Ibn Sina, *Tibb* (medicine) is the knowledge of the states of the human body in health and decline in health: its purpose is to preserve health and endeavour to restore it whenever lost. (Shah, 1966, p.17). For the following reasons Ibn Sina's definition deserves to be whole-heartedly accepted: (i) The name *Tab'iat* (physis), which Ibn Sina has given to his medical system, being derived from *Tab'iyaat* (physic) denotes that it is based on physical laws and not on dogma or superstition; (ii) by describing *tibb* as a branch of knowledge, Ibn Sina plans to present his medicine not as a mere collection of technical data that could only be learnt by the select few but as a complete science of integrated theory and practice which is available to everyone who is desirous of gaining rational ideas of preserving and restoring health; (iii) by emphasizing that health and disease are but states of human body and not malicious influences inflicted by some outside agency, Ibn Sina adopts a more natural view of human ailments; (v) by including the subject of health, Ibn Sina gives the Graeco Arab medicine a much wider scope than what has so far been available in the Western system; (vi) by aiming at the preservation of health, Ibn Sina's medicine promises to be well in advance of our time when to neglect

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of habits, occupation, climate and other social and allied factors, we are still trying to prevent disease through the ordinary methods of municipal hygiene; (vii) by basing his studies on human body, Ibn Sina has given his system a constitutional approach which helps lay proper emphasis on a study of the 'soil' (*Theories and philosophies of Medicine,* Institute of History of Medical Research, New Delhi, 1962; pp.94-95).

At the outset, it should be emphasised that the Graeco-Arab system of medicine is based upon the Pythagorean theory of four proximate qualities—***hot, cold, wet and dry***—of the elements (*Arkan*) and the Hippocratic theory of four humours (*Akhlaṭ*): blood, phlegm, yellow bile and black bile. These qualities felt by human sense of touch affect life in general. The temperaments of persons are accordingly expressed by the words sanguine, phlegmatic, choleric, and melancholic, respectively, according to the preponderance in them of the humours.

The literal translation of the text of Ibn Sina's definition of medicine, however, is verily: medicine (*tibb*) is the knowledge by which the states of the human body are recognised in respect of what is sound and what is lost from it. In order to preserve health, that which is present and restored, and that which is lost. Ibn Sina's textual words advocate as worded inculcate the study on the part of the physician not only of the pathological condition but also of the physiological state of the person under examination. They imply that in striving to cure the diseased state, a physician should not damage the sound one.

Ibn Sina's medicine is holistic medicine and not confined to the knowledge of any particular branch of it, but refers to the whole knowledge as a total recognition of the condition of a patient as presented to the physician. Thus, Ibn Sina's medicine does not allow any treatment which, while curing the ailment, harms the soundness of the body's condition. On the other hand, modern medicine interferes with physiologically inherent forces of *vis medicatrix naturae,* i.e. of self preservation and thwarts it or puts it out of gear.

The causes are four: material, efficient, formal, and final. These, in regard to health and disease, are as follows:

(i) Material causes (*maaddi*) are the substances (and energies) on which health and disease are based. These are: (a) immediate—the organs (*A'ḍa*), and their vital forces (*Arwaḥ*); (b) remote—the humours (*Aakhlaṭ*); and (c) the elements (*Arkān*). The humours and the elements together with the necessary 'change' are the bases of human organization. An object which thus provides the basis of health and disease is so thoroughly organised and altered that from an initial diversity there emerges a holistic unity (*Waḥdat*) with a specific temperament and morphology. The temperament pertains to the change and morphology, to the structure as well.

(ii) Efficient (*F'liya*) causes either prevent or induce changes in the human body. They are: (a) different types of airs and allied factors: (b) food, water and other drinks; (c) retention and evacuation; (d) habitat, residence, etc; (e) rest and activity—physical and psychological; (f) sleep and wakefulness; (g) different periods of life and variations therein; (h) sex variations; (i) occupation; (j) habits; and (k) things inimical or otherwise, which come in external contact with the body.

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(iii) Formal (*ṣouriya*) causes in relation to health are three: (a) temperaments (*mizajat*); (b) faculties (*quwa*) which emerge from them; and

(c) structures (*trākeeb*).

(iv) Final (*tamāmiya*) causes are the functions and to assess them a knowledge of the faculties and their accompanying vital forces would be necessary.

In the light of the foregoing elucidation, the fundamentals of Unani medicine are being presented in this chapter mainly according to Ibn Sina's *Canon of Medicine*, since Ibn Sina is the most prominent authority on the principles of Unani medicine.

Tab'iyat

According to the Unani medicine, the purpose of medicine is to assist natural recuperative power and to disperse or eradicate the disease from the human body. It is supposed that the nature of the body, *Tab'iyat,* spontaneously removes the morbid matter through the process of sweating, urination or defecation. This nature is sometimes assisted in respect by the administration of diaphoretic, diuretics or purgatives.

'Al-'umar al-Tab'iyah', the term derived from the word *Tab'iat* (physical-nature), is considered to be the supreme planner of the body, which is also known as *Tab'iyat al-Mudabbirah lil-badan. Al-umur al-tab'iyah* comprises seven components responsible for the existence of human body, and the maintenance of health. The loss of any one of these components could lead even to death of an individual. These are (i) *Al-Arkān* (pillars-elements); (ii) *Al-Mizāj* (temperament); (iii) *Al-Akhlāṭ* (humours-body fluids); (iv) *Al-A'ḍa* (organ-members); (v) *Al-Arwāḥ* (pneuma-vital spirit); (vi) *Al-Quwa* (faculties-powers); and (vii) *Al-Af'āl* (functions).

Elements

The four Pythagorean qualities or states have been referred to already. It may, nevertheless, be emphasized that these are related to the living beings, including the human body. Their material representatives are the four Empedoclean elements which are also to be understood as simple or elementary constituents of the human body. These are Earth, Water, Air and Fire. Earth represents the solids; water, the liquids; air, the gases; and fire, the heat of the body. They should be understood as natural entities unrefined and unanalyzed; not subjected to chemical, mechanical or electrical processes. They are not to be confused with the modern concept of chemical elements, since modern chemistry, physics and atomic constituents were unknown to the ancients. It is important to note that these four elements were formulated as primary constituents of the human body. Ibn Sina uses two words to name these primary components: *arkān* (pillars) and *'unsur* (element). The word *'unsur* led to confusion with chemical elements and should now be discarded, retaining the word, *arkān* only.

Of the four states or the four qualities, two are active, viz. hot and cold; and two passive, moist and dry. The first pair are in the nature of energy, and the second pair

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belongs to matter. The former two act upon the latter two. Each one of the two pairs is positive, while its counterpart is negative. Hence the two members of each pair are antagonistic to each other and are not co-existent,; only four combinations of them are possible: (i) hot and moist; (ii) cold and moist; (iii) hot and dry and (iv) cold and dry. These four combinations also belong to the four elements. Thus Air is hot and moist; Fire, hot and dry; Water, cold and moist; and Earth, cold and dry. Further, these four qualities are inherent in the elements, and the four elements act in accordance with these qualities.

Temperaments

When these elements intimately mix with one another and through their intimate minutest particles these qualities act and react upon one another, qualitatively and quantitatively, and the positive modified by the negative, there emerges a uniform body possessing the balance of these qualities. The quality of this uniform body or the compound is called its temperament (*mizāj*). Since the primary qualities of the elements are four, namely, heat, cold, dryness and moisture, the temperament of a newly organized or disintegrating body is a product of these qualities (Shah, 1966, p. 24).

According to the definition given by Gruner, 'The temperament is that quality which results from the mutual interaction and inter-passion of the four contrary primary qualities residing within the (imponderable) elements'.

In man and other beings, whose equilibrium or pattern is neither so well balanced nor so close to the absolute balance of temperament, there are eight varieties of temperament: viz. (i) general pattern of species; (ii) specific pattern of species; (iii) general pattern of race; (iv) specific pattern of race; (v) general pattern of individual; (vi) specific pattern of individual; (vii) general pattern of organ (as opposed to that of other organs); and (viii) specific pattern of organ under normal conditions. Temperamental balances, whether of the race, group, individual or organ, are of eight varieties. Of these, the four pertaining to the excess of single qualities are termed 'simple' (*mufrad*), and the four pertaining to the excess of dual qualities are known as 'compound' (*murakkab*) in balances: (i) heat; (ii) cold; (iii) dry; and (iv) moist; (v) hot and moist; (vi) hot and dry; (vii) cold and moist; (viii) cold and dry; there is no coupling of heat with cold nor dryness with moisture.

The above-mentioned eight imbalances (four simple and four compound) are of two kinds: (i) without morbid matter (*Sāda*), these arise *per se* and not from any morbid humour entering the body as, for example, heat in a phthisical patient, and cold when exposed to snow; (ii) with morbid matter (*Maaddi*), meaning that the temperament has become imbalanced by the introduction of morbid matter in the body as, for example, the presence of viscid phlegm producing cold and the excess of leaf-green or verdigris-green bile producing heat. In all, these varieties are sixteen.

Temperament of drugs: It is also worth remembering that when a medicine is regarded as an evenly balanced one, it does not mean that it is absolutely compounding, since it is impossible to do so. It does not also mean that it corresponds to the balance in man. Had it been so, it would have been, in essence, a part of the body. It merely means that

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such a medicine, after being acted upon by the innate heat of the body, produces changes in the normal state of the body and that its pharmacological actions manifest themselves within the limits of the normal human temperament. In other words, when such a medicine is given to a normal person it does not produce any appreciable change, nor any imbalance in the body.

When it is stated that a drug is hot or cold, it does not imply that the drug is essentially very hot or very cold, nor that it is hotter or colder than the human body; otherwise, there would follow the unwarranted inference mentioned above that an evenly constituted medicine has exactly the same temperament as the human body. By a hot or cold drug, it is meant that such medicine produces a greater degree of heat or cold in the body than what was originally present. It is for this reason that a medicine may be cold for the human being but hot for a scorpion, or a medicine may be hot for man and cold for a snake. As a matter of fact, it also means that the same medicine may be less hot for one person than for another. For this reason, physicians are advised to replace the medicine which fails to produce the desired result.

Temperaments of organs: Every animal and every one of its organs has the most appropriate and the best adapted temperament in tune with its nature, functions and conditions.

Vital force and heart, the centre of vital activity, are regarded as the hottest parts of the body followed in the following order: muscles, spleen, kidneys, breast, testicles, muscular coat of arteries, veins and lastly, the skin of palm, which is evenly balanced. The coldest in the body is the phlegm; followed in the order of coldness are: hair, bones, cartilage, ligaments, tendons, serous membrane, nerves, spinal cord, brain, solid and liquid fats, and lastly, the skin. Phlegm is the most moist. Next in this order are the blood, solid and liquid fats, brain, spinal cord, breast, testicles, lungs, liver, spleen, kidneys, muscles and skin. Hair is the driest of the tissues; next in the order of dryness are bones, cartilage, ligaments, tendons, membranes, arteries, veins, motor nerves, heart, sensory nerves and skin.

Temperament of age and sex : The life-span is divided into four periods: (a) growth, which extends to the age of about thirty; (b) maturity, which lasts up to thirty-five to forty years; (c) middle-age, which extends up to about sixty years; and (d) senility during which the vital centre becomes progressively weak until death. The period of growth is divided into five stages: (a) infancy; (b) childhood; (c) boyhood; (d) adolescence; and; (e) youth. In terms of qualities, the period of childhood, which extends from infancy to youth, is balanced in regard to heat but has an excess of moisture. Heat begins to decline during the middle age. Both children and mature persons are a little more hot, while the middle-aged and the old are more cold, besides being dry. Women are colder than men and are also more moist.

Humours

According to the humoral theory of Unani medicine, the four humours, viz. blood, phlegm, yellow bile and black bile, are the components of the fluids of the body. They

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are all contained in the red part of blood; the white phlegm; the yellow bile or cholic, and the black bile or melancholic. Hippocrates asserts: 'The human body contains blood, phlegm, yellow bile and black bile. These are the things that make up its constitution and cause its pain and health. Health is primarily that state in which these constituent substances are in the correct proportions to each other, both in strength and quantity, and are well mixed. Pain occurs when one of the substances presents either a deficiency or an excess, or is separated in body, and not mixed with the others'. He states further: 'It is inevitable that when one of these is separated from the rest and stands by itself, not only the part from which it has come, but also that where it collects and is present in excess, should become diseased, and because it contains too much of the particular substance, causes distress. Whenever there is a slight discharge of one of these humours outside the body, then its loss is accompanied by pain. If, however, the loss, change or separation from the other humours is internal, then it inevitably causes twice as much pain, as I have said; for, pain is produced both in the part from which it is derived and in the part where it accumulates.'

Herein are enunciated the basic tenets of humoral physiology and pathology. It is desirable to evaluate them in the light of modern cellular physiology and pathology. The external and internal milieu of the cells determine their normal and abnormal functioning. How this milieu is related to the four humours and how each of them effects the cellular activity by modifying this milieu require to be investigated. Scientific inquiry of this empirical statement may throw light on the fundamental processes of health and disease.

According to Ibn Sina, humour is a fluid substance which is the initial product of the digestion of food. There are two types of humours—normal and abnormal. The former, singly or in combination with other similar humours, is capable of assimilation by, and complete integration into, the tissues. It is a material for the repair of wear and tear of the body. Abnormal humour, in the absence of proper digestion or conversion, is unsuitable for assimilation and is, therefore, eliminated by the body.

Body fluids are primary and secondary. Primary fluids are the four humours. Secondary fluids are either essential or superfluous. Essential fluids are those which, after suitable alteration, have entered the tissues but not integrated into the structure of the primary tissues. These fluids are of four types: (i) the intra-vascular (*maḥṣoora*) fluid, which circulates in the minute vessels of the tissues; (ii) the pericellular (*ṭalliya*) fluid, which remains in the tissues like dew drops. This fluid is capable of being utilized as nutrient at times of necessity. It also moistens the organs which have dried because of excessive activity; (iii) the intra-cellular (*qareeba*) fluid in the tissues is the nutrient in its final form, and, in fact, is similar to the tissues in nature and quality, but not yet acquired their consistency; and (iv) the cellular (*munwiya*) fluid, which from the very beginning of the development, is a part of the tissues and leads to the integration of various constituents of primary tissues. It is derived from seminal fluid which, in its turn, is derived from the humours.

Primary fluids—the normal as well as the abnormal—are of four kinds; blood (*dum*), phlegm (*bulghum*), bile (*ṣafra*), and black bile (sauda). Blood is hot and moist in temperament, and may be normal or abnormal. Abnormal blood is of two varieties (i) that which has become abnormal through a change of temperament, such as getting hot

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or cold; and (ii) that which has turned abnormal from and mixture with the humours derived from (a) outside, or (b) produced within the blood. Thus, for example, when a part of blood gets putrefied, its lighter portion is converted into abnormal bile, and the heavier part into abnormal black bile.

The phlegm is cold and moist in temperament, and may be normal and abnormal. The latter has several varieties; (i) mucoid phlegm; (ii) immature phlegm; (iii) watery phlegm; (iv) thick phlegm; (vi) salty phlegm; (vi) sour phlegm; (vii) astringent phlegm; and (viii) vitreous phlegm.

Bile is also of two kinds and may be normal and abnormal. Normal bile is hot and dry in temperament. Abnormal bile has two varieties: (i) the bile mixed with some extraneous material; and (ii) that which has an altered composition. These two varieties, too, have some varieties. Black bile has also normal and abnormal varieties. The former is the sediment of normal blood, cold and dry in temperament. The latter is produced by combustion and sedimentation. There are also several varieties of abnormal bile.

A Graeco-Arab physician attaches great importance to diet and digestion both in health and in disease. While prescribing medicine, he stipulates regimen and directs on the foodstuffs to be avoided. Correct diet and digestion are assumed to produce correct balance of humours and maintain progress of health, whereas faulty diet and digestion derange the balance and produce disease. Obviously, the humoral imbalance can be corrected by medication coupled with proper diet and digestion, because improper diet and digestion can aggravate the disease or interfere with the healing effect of medicine. The four humours produced by coction are taken up by the blood stream and carried to various parts of the body where each part is furnished with the power of absorption of appropriate humours. The quality of humours as products of digestion of food is determined by the nature of food. The disturbed balance of humours can be aggravated by inappropriate diet or corrected by appropriate diet. Unani physicians pay attention to the humoral temperament of a patient. A person of sanguine temperament has excess of blood humour; one who is bilious has excess yellow bile, while morose and melancholic temperament of a persons is due to excess of black bile. Persons who are phlegmatic have excess of the humuor phlegm. While prescribing diet to a patient of phlegmatic temperament, a Unani physician would prescribe abstinence from phlegm-producing articles of food. The art of medicine is still based upon much empiricism, and its scientific validity requires a great deal of research.

According to the Hippocratic theory, a disease may be caused by (i) deficiency; (ii) plethora; and (iii) segregation of humours, i.e. alteration of the normal qualitative and quantitative humoral composition of the site of disease or pain. Consequently, treatment should aim at the restoration of that normal state.

Faculties and functions

Faculties (psycho-physical drives) and their functions are complementary to one another. Each faculty gives rise to a specific function, and each function is an expression of its corresponding faculty. Hence, they have to be dealt with together. There are three

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faculties in the body and three types of functions arising from them. The faculties are: (i) nervous (*nafsania*); (ii) physical (*ṭaba'iyya*); and (iii) vital (*ḥaiwania*). Many philosophers and most physicians, including Galen, believed that each faculty would have its own primary organ as a centre that would give rise to all of its functions. According to them, nervous faculty is of two varieties: one is responsible for the preservation of an individual and it is centered in the lever, while the other is the reproductive faculty which is responsible for the progeny. It is concerned with the formation of seminal fluid and its subsequent development into a specific form. It is located in the testicles. The vital faculty conditions the vital force, sensation as well as movement, and prepares it for sensory and motor activity of the brain. It also enables the vital force to give life to various parts of the body wherever it goes. This faculty is located in the heart.

Physical faculty is two-fold: (i) primary; and (ii) secondary. Of the primary faculties, one is concerned with the preservation of an individual and the other, with the preservation of race. The former which serves the individual is the faculty of nutrition and growth, while the latter which serves the race is the faculty of reproduction and development. The faculty of reproduction consists of the generative and formative faculties.

Nutrition consists of (i) absorption; (ii) assimilation; and (iii) integration. The secondary physical faculties are the various processes which assist nutrition, and these are four, namely; absorption, retention, digestion and expulsion, which are served by the four primary qualities —heat, cold, dryness and moisture.

Vital faculty: According to the Unani physicians, vital faculty is the power that enables organs to receive sensory and motor activity and perform the various functions of life. Emotional movements in the form of fear and anger are also attributed to this faculty because the movement of expansion and contraction of the vital force that accompany the emotions are caused by this faculty.

The nervous faculty consists of (i) cognition (*mudrika*); and (ii) conation (*muḥarrika*). The former is also of two varieties—the external (*zahir*) and the internal (*baaṭin*). It operates by means of the five, according to some, of eight senses. The five senses are vision, hearing, smell, taste and touch. When sensation is considered to be of eight varieties, the sensation of touch is sub-divided into four: pain, temperature, smoothness, or roughness and softness or hotness. The latter internal cogniton is the vital faculty (as termed by philosophers), which has the five varieties: (i) perception; (ii) thinking; (iii) intuition; (iv) memory and recall; and (v) intellect. As for the nervous faculty, conation is the process by which the contraction and relaxation of the longitudinal muscular fibers move the joints and other organs. This results from the transmission of impulses to muscles through their corresponding nerves. Each muscle has its own mode of movement and activity. But since the movement is initiated by thinking, it is subordinate to the *will*.

Disease: General description

Diseases and their descriptions are broadly recognized as being one of the notable aspects of the Unani system. The classification of diseases is of two kinds—simple and complex.

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Simple diseases are the various disturbances of temperament and structure. Complex diseases are those in which two or more abnormalities combine to form a single disease. The former are of three types: (i) diseases of temperament; (ii) those of structure; and (iii) of continuity (and dislocations). A diseases is thus referred to as belonging to one or the other of these three groups. Diseases of temperament (*Sue-i Mizaj*) *which are 16—four simple and four compound and with or without complicating morbid matter.*

Diseases of structure (*Sue-i Tarkeeb*) affect the form, size, number and positions of organs. Diseases of form are of four types, namely, deformities which involve shape, ducts, cavities and surface.

In the case of deformation of shape, there is a change in the natural shape of organs with some disturbance in their functions. Deformities of ducts and orifices are of three types: (i) dilatation; (ii) contraction; and (iii) occlusion. Those of cavities and sacs are of four types. (i) increase in size (dilatation); (ii) decrease in size (narrowing and contraction); (iii) occlusion; (obstruction); and emptiness. Deformities of surfaces are of two types: (i) loss of normal roughness; and (ii) loss of normal smoothness.

There are also other aspects of diseases such as their distribution in terms of their increase or decrease in size. Their number is also altered in relation to the increase or decrease in the physiological and pathological conditions.

Diseases of position: The diseases change their positions in two respects—a change in respect of the natural position of an organ or relative to the position of another organ. The former is of four types: (a) dislocations; (b) partial displacements; (c) involuntary and abnormal movements of organs; and (d) lack of normal mobility. The changes relative to the position of neighbouring structures are: (a) inability of an organ to move towards another; and (b) incapacity of an organ to move away from the other. There are diseases of continuity—injuries, wounds and ulcers, dislocations and fractures.

In the Unani system, a complex disease does not mean the simultaneous occurrence, by chance, of several diseases in one person, but the presence of a number of abnormal conditions in the form of a single disease; for example, a swelling. Boil is a variety of swelling which shows all the three disorders:

(a) temperamental disturbance as the humoral abnormality without which there could be no swelling; (b) structural disturbance like the deformity of shape, size, and, occasionally, of an organ; and (c) loss of continuity from the separation and, disruption of tissues by the excremental matter (inflammatory exudates), which might collect between the composing tissues.

General causes: Human body has three states viz. health, disease and the intermediate state. The three states have three sets of causes—predisposing (*sabiqa*), constitutional (*waaṣila*) and external (*bādia*). A cause does not always begin to operate at once. In fact, there are three conditions which must be fulfilled: (a) the agent must be powerful; (b) the body should be suitably predisposed (susceptibility); and (c) there should be sufficiently prolonged contact between the agent and the body (incubation period).

Six essential factors: It may be emphasized that the factors responsible for the maintenance or bringing about changes in the states of body may be either essential or non-essential. The essential factors are those which influence the body throughout life

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and are six in number: (a) atmospheric air; (b) food and drink; (c) rest and activity of body; (d) psychological activity (*Ḥarkaat-i nafsania*); (e) sleep and wakefulness; and (f) elimination and retention. The effects of these six essential factors have been described in the Unani classical texts in detail.

Effects of atmospheric air: The effects of air that surrounds us are very important. Air, an elementary constituent of our physical body and vital forces, is also an important agent, which constantly purifies and conditions the body by restoring its balance and moderating it for a healthy living. By conditions it is meant that the moderation of temperament of the vital force is rendered hot, more often by aggregation and less by other causes. Moderation has the connotation of the restoration of balance towards normalcy. The vital force is moderated by the air inhaled through the lungs and taken through the pores adjoining the arteries.

The process of purification moderates the vital force by a judicious elimination of the smoky or hot vapour during aspiration. The hot vapour is undesirable to the vital force as the waste products are to the body as a whole. Air cools and purifies the vital force which thus gets moderated. Man remains healthy as long as the inspired air is well balanced, pure and free from mixture and substances injurious to the vital force; but no sooner is air vitiated than a person becomes ill.

Air is subject to three types of variations namely; (i) normal; (*Ṭaba'i*); (ii) abnormal but harmless; and (iii) abnormal and harmful. Normal variations are the seasonal changes because air undergoes a characteristic change of temperament during each season. Ibn Sina has described three types of air in detail under various topics; for example, temperamental characteristics of seasons, seasonal changes and the laws governing them, the qualities of fresh air, qualitative influence of weather, seasonal abnormalities, changes of weather which are abnormal but not pathogenic, abnormal changes in the atmosphere which are injurious, the effect of wind direction and the influence of habitat.

Food and drinks

Food and drinks, after their consumption, would affect the body by their: (a) quality; (b) elementary constitution; and (c) essence (*jauhar*). In every day parlance, these terms are used synonymously, but there is some difference in their connotation. Qualitative action appears after the substance has entered the human body and, by becoming hot or cold, it produces heat or cold in the body but does not become part of the body. Elementary or material action depends upon the actual substance utilized and integrated into the tissues. Sometimes this material, even after digestion and full alteration, may, from the first to the very last, continue to retain its original quality to an extent much more than what is regained by the body, until it is assimilated. For example, blood formed by the digestion of lettuce remains cooler than the normal human temperament until it is assimilated by the tissues. Similarly, blood formed after the digestion of garlic acquires the opposite quality of heat. Essential or specific action is dependent upon the characteristics which determine the very nature and essence of food. It is a result of neither its quality nor its material. By *quality* is meant one of the four primary qualities—

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heat, cold, moisture and dryness. The material action means that the substance after its complete alteration (a) repairs the tissues worn out by use; (b) increases the quantity of (humoral) blood and thus strengthens the vital force; and (c) acts through a residuum of its original quality.

Medicines

Medicines have four grades of potency: drugs of the first grade, or those which in specified doses do not produce any appreciable effect on the body. For instance, heat or cold produced by them is not felt at all unless the drug is taken repeatedly or in large doses. Those of the second grade are a little more potent than the former, but are neither so potent as to produce any visible disturbance in the functions of the body nor are they *per se* inferior in the normal course of physiological functions except secondarily. It is only when administered repeatedly and in larger doses that they produce any visible damage or disturbance of normal functions. Drugs of the third grade in specified doses produce *per se a* notable disturbance of normal functions of the body but not to the extent of producing disease or death, unless taken repeatedly or in larger doses than normal. The fourth grade ones are those which produce damage or destruction of the body. They are poisonous drugs which act by their characteristic qualities. A substance, which is lethal by its specific nature, is a true poison.

To put it differently, all substances, which come in contact with the body and act and react upon it, are of three types; (i) those which are altered by the body but do not produce any changes in the body; (ii) those which are altered by the body and produce changes in it; and (iii) those which are not altered by the body but even so produce changes in it.

Substances which are altered (metabolized) by the body but do not produce any appreciable change are: (a) nutritive food articles in general which become part of the body; and (b) non-nutritive substances which are the balanced medicines. Substances, which are altered by the body and also produce changes in it, are: (i) those the action of which ceases after digestion and are: (a) assimilable as the medicinal foods; (b) non-assimilable as actual medicines; and (c) those which continue to act even after digestion until they produce destructive changes in the body. These are, of course, the poisonous medicines. Substances, which produce changes in the body without changing themselves, are also the real poisons. In this respect, it should be remembered that the absence of alteration in a poison does not mean that it is not even heated by the body. If that were the case, most of the poisons would be inert. It merely means that they do not undergo any change in their physical form and that their specific action continues unhindered until the body succumbs to their lethal effect. Poisons differ from one another in their normal qualities. If a poison is hot by nature, its heat will assist its ability to disperse the vital force; for example, snake venom and aconite. If it is a cold poison, its coldness will enhance its ability to suppress the vitalities; for instance, scorpion venom and hemlock.

Medical foods: Some foods are predominantly medicinal, while others are nutritive. Some are highly nutritious as alcohol, yolk of eggs and meat juice, while others are less

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nutritious, such as bread and meat. There are some foods which are slightly nutritious like the pure medicinal foods.

This distinction is similar to that observed in respect of the foods in general. Some foods in their temperament are close to the intrinsic nature of blood; for example, alcohol, yolk of eggs and meat juice (*maa-al-laḥam*). Some are not so close; for example, bread and meat. There are others which in their temperament are indeed quite remote from the intrinsic nature of blood. These are also the medicinal foods. Foods affect the body with their quality and quantity or both.

Like foods, the quality of water is also important in the Unani medicine as in other systems. The characteristics of good water; water-testing; purification of water; various types of water (rain water, marshy water, well water, hail and snow—yielding impure water—snow ice, cold water, water containing metallic substances, salt water, hot water, turbid water, etc.) have been described in detail in the Unani medical literature.

Rest and activity of body: The effect of activity varies according to its (i) severity—mild or vigorous; (ii) extent—moderate, short or prolonged; (iii) speed—rapid or slow; and (iv) associated factors, if any. It is common knowledge that all forms of activity, whether vigorous, prolonged, mild or slow, produce more heat and less its dispersion. Prolonged activity of every kind, however, leads to the dispersion of innate heat (*ḥararat-i ghareezi*) and thus produces cold and dryness in the system. Rest is always cooling and moistening—cooling because there is no excitation of heat with an inward collection and aggregation of matter which suppresses the heat; moistening, because it hinders the proper disposal of wastes.

Psychological factors: All emotions (*'awariḍ-i nafsania*) are accompanied or followed by inward or outward movements of the vital force. These movements may be sudden and severe, or mild and gradual. When the vital force moves outwards the interior becomes cold. Sometimes this movement may be so excessive that the vital force gets suddenly dispersed and produces cold, both in the interior, and the exterior of the body, thus causing deep coma or death. The outward movement of the vital force is sudden, as in anger, or gradual, as in pleasure and happiness. Similarly, the inward movement of the vital force is sudden as in intense fear or acute terror, and gradual, as in sorrow. The severe contraction and dispersion of the vital force always results from the suddenness of its movement. When its movement is slow and gradual, there is only a mild contraction and gentle dispersion of the vital force.

In addition to emotions, there are other psychological factors which influence the body; for instance, mental factors which produce physical changes. Thus the looks of a baby take the resemblance of the person who was in the mind of the mother at the time of coitus, and its complexion is nearly of the same colour as its father has in mind at the time of seminal emission. Another psychological effect is the rush of blood to the face which occurs by intently gazing at red objects. Teeth become sour by the mere sight of someone eating sour things. Pain and sorrow experienced by someone else can produce similar conditions in the onlooker. Friable vision and pleasant scenes also produce corresponding changes in the temperament.

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Effects of sleep and wakefulness

Sleep closely resembles body rest, while wakefulness is akin to its activity. There are also some other characteristics common to them, and it is necessary to keep these in view. Sleep directs the innate heat inwards and strengthens the physical faculty. It also weakens the nervous faculty by relaxing and moistening the passage (of impulses), and by making the vital force dense through the stoppage of dispersion produced by wakefulness. Sleep removes all types of fatigue and stops the excessive flow of excretion promoted by activity. However, it helps expel the waste matter from the vicinity of skin by confining the innate heat to the interior of the body and circulating the usual nutriment to all parts of the body, including the periphery where it pushes out the waste by pressing from behind. Wakefulness is, however, more effective in this regard, and has the opposite effect to that of sleep. Nevertheless, when it is excessive, it disturbs the brain by producing dryness and weakness, and thus causes confusion. The burning of humours leads to an acute type of mental disorders and also produces cold type of diseases from its failure to disperse the waste.

Effect of retention and depletion

Retention of 'matter' which is ordinarily eliminated by the body occurs when (i) the expulsive faculty is weak; (ii) the retentive faculty is excessively strong; (iii) digestion is weak and there is prolonged retention of food; (iv) lumen is narrow and obstructed; (v) matter is unduly thick or viscid; and (vi) there is insensitivity as in biliary colic, and the energy of body is occupied elsewhere resulting in the urine and faeces being retained as in acute fevers. Retention produces various temperamental and structural diseases, including the loss of continuity and complex disorders. Depletion or loss of material which is normally retained by the body occurs when (i) the expulsive faculty is strong; (ii) retentive faculty is weak; (iii) the matter is of a disturbing type i.e. it produces heaviness from its being excessive or causes distention from its being gaseous or produces irritation and burning sensation by its agitation and activity; (iv) matter is so thin that it flows by itself and is thus easily expelled; (v) widening of excretory channels as in spematorrhoea; and, (vi) rupture, longitudinal or transverse, in the channels and dilation of orifices as in epistaxis. The widening of channels may be from external and internal causes. A depletion which is ordinarily retained makes the temperament cold because it is a loss of the material which activates the innate heat and strengthens it. Occasionally, however, depletion from the elimination of matters such as cold phlegm or balanced blood, produces moisture similar to the production of heat as mentioned above. This happens when there is moderate elimination of some dry humour. Similarly, moisture follows depletion because the enfeeblement of innate heat of metabolism impairs digestion and leads to a relatively excess of phlegm.

Baths (Ḥammamat)

Unani medicinal care also describes sun-bath, sand-bath, oil-bath, and sprinkling cold water on the face. The best bath—*ḥammam*—are housed in old spacious buildings having

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four apartments with adequate supply of fresh air and sweet water. There should also be proper arrangements for regulating the temperature according to the individual temperaments. The natural effect of baths is that hot air warms the body, and water adds to the moisture. The first room of a *ḥammam* is cold and moist; the second, hot and moist; and the third, hot and dry; the fourth, the ordinary waiting room for the *ḥammam.* The four apartments of the *ḥammam* represent the four seasons—autumn, summer, winter and spring. No attention needs to be paid to the erroneous assertion that water, whether used externally or internally, has no moistening effect on the primary tissues of the body.

Occasionally, baths produce heat in the body by helping the stomach to digest even indigestible foods and by assisting the maturation of cold humours. Sometimes, a bath is taken dry (sitting in the bath house without the usual bathing and without sprinkling any water on the floor of the *ḥammam)*when it produces dryness and thus benefits ascites and dropsy. A moist bath, of course, results in strengthening moisture. Prolonged stay in a *ḥammam* produces dryness because of sweating and evaporation; but a short stay produces moisture by assisting the penetration of water before the start of sweating. If baths are taken early in the morning and with an empty stomach, the sever dryness that follows causes weakness and wasting. Bath, when taken with full stomach, produces obesity by promoting the absorption of partially matured food from the stomach and liver, and in this way predisposed to stasis and obstructions.

Medicated baths are classified according to the type of water and may thus be nitrous, sulphurous, sea-water, alkaline or saline. Such baths may be artificial, natural or medicated by boiling alum, laurel, or stavesacre in water. Baths of this type are useful in cases of oedema and dropsy. They help to reduce discharge from wounds and are beneficial for those suffering from guine, a worm infection. Bath-water containing compounds of copper and iron or salt, are useful in cold and moist diseases such as rheumatism, gout, paralysis, asthma and diseases of kidneys. Such baths also help strengthen the callus of fractured bones and beneficial to the cure of boils and carbuncles. Bath-water containing copper compounds are good for curing stomatitis, throat opthalmia and discharging ears. Water, which contains iron salts, is excellent for stomach and spleen and that which contains salt or nitre, benefits those who are predisposed to diseases of brain and lungs as well as those suffering from gastric catarrh, ascites, distention and the like.

Signs of basic temperaments

The signs, which assist in the diagnoses of temperament, are given under ten headings as follows: (i) feel of the body; (ii) muscularity and adiposity; (iii) hair; (iv) complexion; (v) physique; (vi) receptivity of organs; (vii) sleep and wakefulness; (viii) functional state of organs; (ix) excretions; and (x) psychological activity.

Pulse examination

Unani physicians profess that to judge the nature of the functional disturbance of the human system empirically, it would be essential to examine the pulse of a patient. This

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judgement is based on the personality and experience of the individual physician. Pulse is a movement of expansion and contraction in the receptacles of the vital force (heart and arteries). The purpose of this movement is to condition the vital force with light air. Although the subject of pulse can be discussed from the point of view of (i) the general principles governing the pulse and (ii) the type of pulse in each and every disease, we present here only the general principles which govern the pulse.

Each pulse-beat consists of its two periods of movements and two of its rest, because each beat has one period of expansion as well as one of contraction. It is also necessary that between the two opposite types of movements, there should be a period of rest. It is, therefore, obvious that each pulse-beat before the next has two periods of movements and two of its rest. Unani physicians have laid down ten features for examining the pulse and its variations as follows;

(i) *Size*: This is noted in the three spatial relations of the pulse during expansion, i.e. height, length, and breadth. The pulse has thus nine simple and a large number of compound varieties. The nine simple varieties of the pulse are the long, short and medium; the broad, narrow and medium; and the high, low and medium; (ii) *Strength*: The pulse as felt by the finger may be strong, feeble or medium. A strong pulse is the one which, during expansion, strikes forcibly against the physician's fingers. A feeble pulse is the opposite of a strong pulse, while a medium pulse, in this respect, is midway between the two; (iii) *Speed:* the pulse beat may be quick, sluggish or medium in its movement. A quick pulse is the one in which the duration of individual beats is shorter. Sluggish pulse is the opposite of a quick pulse and a medium pulse is of the average speed between the quick and the sluggish pulse; (iv) *Consistency (elasticity)*: The vessel wall may be soft, hard or medium. Soft pulse is the one which is easily compressed with the fingers, while a hard one is the opposite of the soft pulse. A medium pulse is the average between the two; (v) *Fullness*: The pulse may be full, collapsing or medium. A full pulse is the one which gives the feeling as if, the artery is full of blood. A collapsing pulse feels the opposite of the full pulse, and a medium pulse, is of average fullness between the two extremes; (vi) *Temperature*: The pulse may be hot, cold, or moderate in temperature; (vii) *Rate (frequency)*: Pulse is rapid or slow in frequency according to the length of interval between the succeeding beats. When the period between the two beats is less than the normal, it is rapid. A medium pulse in this regard is of average rate between the two extremes; (viii) *Constancy: A* pulse may remain constant or vary in respect of the five features mentioned above. The variation may extend over several beats or involve a single beat, or part of a beat e.g., pulse may be rapid in one beat from increased (metabolic) requirement of body, and weak in another beat due to reduced vitality; (ix) *Regularity:* An irregular pulse may be regularly irregular or irregularly irregular. A regular irregularity is the one which is repeated in a systematic manner. The irregularity is simple when it pertains to a single feature of the pulse, but it is complex when more than one feature is involved e.g., the pulse shows two different types of irregularities, but each one is so repeated that both irregularities form a single cycle of a regular, complex irregularity. An irregularly irregular pulse is converse of the above; and (x) *Rhythm (wazan):* It should be noted that pulse has a rhythm similar to that of music. In music the notes are related to

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one another both in their pitch and time intervals. The case of the pulse also is similar, because its beats are related to one another in strength and time intervals. Just as the notes and intervals of music may be in concord or otherwise, the pulse, too, may be rhythmic or arhythmic. The rhythm of the pulse is the time relation between the two periods of movements and the two periods of its rest. When these relations are not perceived, the rhythm is taken to be the relation between the period of rise and the period of rest in two consecutive pulse beats. In short, the period of movement should be compared with the period of rest.

The pulse may be eurythmic or dysrhythmic. The latter is of three varieties:

(a) pararhythmic is the one of a child, which would be like that of a young man;

(b) heterorhythmic of child's pulse corresponds to that of an old man's pulse; or

(c) etrhythmic in which the rhythmic is so utterly abnormal that it does not correspond to the rhythm of any age. Marked deviation of rhythm indicates the gross derangement in the body.

Varieties of Compound pulse: Some important compound pulses are: (i) *ghazali* (similar to the *pulses bisferiens*); (ii) wavy (undulant); (iii) vermicular (*doodi*, worm-like); (iv) ant-like; (v) sellate; (vi) decurtate; (vii) spindle-shaped; (viii) Dicrotic; (ix) intermittent; (x) supernumerary; (xi) jerky; (xii) tremulous; (xiii) twisted; and (xiv) cord-like.

Ibn Sina has described pulses in great detail under several headings such as normal pulse, factors governing the pulse, effects of intrinsic factors, sex and age, temperament, seasons, regions or countries, food and drink, sleep and wakefulness, exercise, baths, pregnancy, pain, swelling, emotions and of factors inimical to the body.

Urine examination

Examination of urine of a patient is one of the important diagnostic methods of Unani medicine. According to Ibn Sina, unless the following conditions are observed, the information derived from urine examination is not entirely reliable: (i) urine to be examined should be passed in the morning; (ii) the specimen should not be retained for too long; (iii) it should be of overnight urine; (iv) no food or drink should be taken before the collection of urine; (v) substances which colour the urine yellow or red such as saffron and purging cassia, vegetables which make the urine green, almuri which turns the urine dark, and wine which imparts its own colour to the urine should not be taken; (vi) cosmetics which colour the urine should not be used e.g., *ḥena* applied to the skin and nails sometimes colour the urine; (vii) diuretics which expel some specific material such as phlegm and bile should not be taken; (viii) undue mental and physical exertions should be avoided as these, too, would colour the urine, e.g., fasting, lack of sleep, fatigue, hunger and outbursts of anger make the urine red or yellow, vomiting, diarrhoea and polyuria also change its colour as well as its density; (ix) urine should not be kept standing for more than six hours as it then becomes useless for examination, because after some time the colour begins to change and the sediment gets dispersed; (x) the sample should be of the whole urine collected in a wide mouthed bottle without any

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spilling; (xi) examination should not be carried out at once but after the urine has been allowed to settle for sometime; (xii) care should be taken to avoid undue exposure of the urine to sun and air; exposure to the sun tends to produce fermentation, and cold air makes the urine so dense that it fails to yield even the usual deposit appearing after normal digestion and maturation; (xiii) the glass for collecting the urine must be thoroughly washed before used; (xiv) it should be clear and colourless; (xv) the specimen should be examined from both near and far; (xvi) it should be protected from exposure to heat or cold; and (xvii) it should be examined in good light but not in direct light as its observation would then be difficult.

The points to be noted about the urine are: colour, density, turbidity, transparency, sediment, quantity, odour and froth. By colour is meant the various shades of colour observed by the unaided eye i.e., white, black and the intermediate shade. Density refers to the thickness and thinness of urine. Density is different from the turbidity and transparency of urine. A thick urine may be clear like the white of an egg, glue or olive oil; sometimes it could be thin and yet look like turbid water. Urine becomes turbid from the suspension of dark coloured particles. Turbidity differs from sediment in that the particles are intimately mixed with urine, while the sediment is quite distinct and separate from the liquid part of urine. The difference between turbidity and simple colouration is of a similar nature. Colour is the result of dissolved particles, while turbidity is due to suspended particles.

Stools

For a thorough examination of a patient, the inspection of his stool or faecal matter is also very important. Its quantity is judged by taking into consideration the amount of food consumed. Large stools indicate abundance of humours, while scanty stools, their deficiency. Stools are retained through obstruction in the caecum, or in small intestine as a prelude to colic. Sometimes the stools may be scanty because of the weakness of the expulsive faculty. As for its consistency, liquid stools point to indigestion or obstruction. Weakness of the mesenteric vessels produces liquid stools by interfering with the absorption of fluid into the portal vein. Viscid stools are a sign of wasting, but the stools then are foul-smelling. Frothy stools result from excessive heat or the excess of *reeḥ*. Hard and dry stools with mucus indicate delay in the passage of stools or lack of irritative bile. When the stools are markedly yellow, there is excess of bile. Stools which are pale indicate defective digestion and lack of maturation; white stools denote obstruction in the bile-duct and jaundice. If stools contain offensive white pus (*qeeḥ*), it is likely to be from the rupture of an abscess. Black stools are generally due to excessive combustion or maturation. The worst type of black stool is the one which has been excessively burnt. If stools are in the nature of a froth, instead of being firm and compact or puffed up like cow-dung, they are a sign of *reeḥ*.

If stools are passed quickly, there is likely to be some disturbance such as excess of bile or weakness of the retentive faculty. When there is delay in the passage of stools,

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there is either weak digestion, cold temperament of intestine or excess of moisture. In the case of flatus, stools are passed noisily with the elimination of wind.

Preservation of Health

In the medical practice of health preservation, it is necessary that proper balance between the various essential factors already described, should be ensured. Of these the following need special mention:-

(i) maintenance of balanced temperament under the varying conditions of life;
(ii) consumption of suitable food and drink; (iii) adequate care of organs; (vi) purity of inhaled air; (vi) healthy environment; and (vii) moderation in physical and mental activity, including sleep and wakefulness. Ibn Sina has described regimen for children separately.

The three fundamentals of health preservation are; exercise, diet and sleep. Exercise is a series of voluntary movements which produce deep and rapid respiration. A moderate amount of exercise, taken regularly, is an effective prophylactic against all temperamental and humoral disturbances provided due attention is also paid to the other essentials of health. Exercise is of two kinds: one is incidental to ordinary occupational activities; and the other is carried out purposely for the sake of its benefits. The second kind of exercise varies according to its duration, intensity and mode. It may thus be short or long, mild or strenuous, slow or rapid. Exercise may be of mixed type such as rapid, strenuous, mild and slow.

There are several types of strenuous exercises such as: (a) wrestling; (b) trial of strength against each other; (c) boxing; (d) running; (e) brisk walking; (f) archery; (g) javelin-throwing; (h) jumping over or horizontal bar and swinging; (i) hopping on one foot; (j) sword play and fencing from horse back; and (k) the one in which while standing on the toes the arms are kept raised in front of the chest and then moved forward and backward in quick succession.

Massage: There are several varieties of massage: (a) hard, which makes the body firm; (b) soft, which relaxes the body; (c) prolonged, which reduces weight; and (d) moderate, which develops the body. Various combinations of these varieties provide nine types of massage. There are also some other types of massage.

Ḥammamat are considered to be very significant in Unani medicine. As home measures of health preservation, persons do not need disperse baths, since their bodies are generally free from the accumulation of waste products. If any one does require a bath, it is for receiving benefit from its mild warming and moderating property. A healthy person should not, therefore, stay in bath for too long even if the bath is a medicated one. He should remain in bath until the face is flushed and stop bathing when the body begins to feel weak. The benefits of *ḥammam* are: (a) induction of sleep; (b) dilatation of pores; (c) cleansing of skin; (d) dispersion of waste matters; (e) maturation of waste products; (f) driving nutriment towards the surface of body; (g) physiological assistance towards

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the dispersion and excretion of poisonous matters; (h) prevention of diarrhoea; and (i) removal of fatigue.

Management of food: A person desirous of preserving health should avoid medicinal food in the diet. Excessive use of fruits and vegetables which are of therapeutic nature should be avoided. The reason is that the medicinal foods which are light affect blood; while those which are heavy, give rise to excess of phlegm and make the body obese and heavier. Unani medical texts give some details about normal diet, order of meals, indigestion and aids to digestion, exercise, seasons and food, temperament of food, rules to be observed after meals and related aspects. Likewise, there are also details about water, alcohol, regimen for old age and management of temperamental abnormalities.

General Principles of Treatment

Treatment is carried out by (a) general management and diet; (b) simple and compound drugs; and (c) operative procedures.

The choice of drugs for treatment is governed by three rules: (i) drug such as hot, cold, moist or dry; (ii) quality of drug in terms of its weight and potency, i.e. strengths of its hot or cold quality; and (iii) time of administration. The treatment of disease is 'allopathic' (*bil ḍid*). The drug is contrary to the nature and qualitative pattern of the disease, whereas health is preserved by (*bil shakal*) a concept of similarity . It may be noted that the latter has been applied by Hahnemann to the treatment of diseases in homeopathy.

The knowledge of anatomical relations is helpful in selecting the root of administration for the drugs and the mode of elimination of the morbid matter. Elimination plays a very significant role in the treatment of Unani specially in the case of chronic diseases. The points to be considered specially in the use of eliminates are the strength of a patient, his temperamental state and abnormal developments. Elimination includes all measures such as purgation, emesis, diuresis, and venesection. For carrying out any type of elimination, one of the following five aims should be kept in view:

(i) only the matter required to be eliminated should be removed; this would ensure rest and produce sedation; (ii) it should be in the direction of outflow; thus nausea should be treated with emesis, and gripping, with purgation; (iii) it should be through an appropriate organ and towards the one where morbid matter is drifting; (iv) the time of elimination should be decided according to the presence or absence of maturation; (v) the quality of matter to be removed should be estimated from (a) the amount of matter in the body; (b) the strength of patient; and (c) the chances of complications. There are some details about the absorption and diversion of morbid matter, general instructions for eliminations, rules and mode of action of emesis and purgation, treatment of excessive purgation, management of ineffective purgation, and general description of purgatives. Like purgation, Ibn Sina has described in detail also emesis, enema, douches, venesection, cupping, use of cautery, leeches, etc.

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Unani and modern Medicine

In the words of Gruner: "Modern medicine is based on the conception of the universe as a conglomeration, of dead matter out of which, by some unexplainable process, life may become evolved in form. To Ibn Sina, the whole of the universe is the manifestation of a universal principle of life, acting through the instrumentality of forms. Or, again, in modern medicine, the forms are the source of life, to Ibn Sina, they are the product of life. Space itself is an aspect of the one life" (Gruner (1930),p,9).

Gruner selected the *Canon of Medicine* of Ibn Sina for translation not only for the importance of this work, but also to the special reason that Ibn Sina accepted the theory of nature, which in his opinion is more comprehensive than the modern germ theory. He says: "The main purpose of this treatise will not be seen to centre in the idea that in the ancient philosophy there is material capable of useful application today. The selection of the work of Ibn Sina is not intended to provide an opologium for that one author, but is specially appropriate for these reasons: i) his acknowledged excellence; ii) his greater accessibility among medieval medical writings; iii) a certain indefinable charm of explanation peculiar to himself; but, above all; iv) the fact that his central theme is a conception of the nature of human being really identical with that of Thomistic philosophy, specially stressed and developed by 'modern scholastic philosophy'. As these are related, so might Ibn Sina be related to a modern scholastic medicine which would aim at reasons for health and ill-health far deeper than those given by the microbic and cognate theories" (Gruner (1936), p.19).

The basic difference between the Hippocratic and Ibn Sina's medicine and modern medicine is set forth by Gruner in the following table (Gruner, p.s).

Ibn Sina's Canon treats of	*Modern medicine consists of*
1. *Speculative medicine,* certain fundamental principles (cosmology, psychology, metaphysics).	
2. *Parctical Medicine*	
A. Application of fundamental ideas to the study of (i) health; (ii) disease (tendency, predisposition, threshold stage, declared disease); and (iii) cessation of life.	A. *Principles of Medicine*
	Theory ; application of the facts of chemistry, physics, anatomy, and biology to the systematic description of innumerable diseases, classification as far as possible on the basis of the microbic theory; symptomatology, etiology, and diagnosis.

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B. Actual treatment of 'disease' by (i) regimen, (ii) drugs, (iii) operative interference.

B. *Practice of medicine*
a) Laboratory work and dietetics
b) Therapeutics, pharmacology and dietetics; c) Surgery; d) Gynaecology and Obstetrics; e) State medicine: hygiene in all its branches f) Psychological medicine: treatment of insanity; g) Legal medicine.

There are four main conceptions belonging to the *Canon*, but not recognised by modern medicine. These conceptions are related to (a) the nature of human being as a whole; (b) the constitution; (c) the breath; and (d) the elements. Philosophy in the Graeco-Arabian sense, however, means the knowledge as a whole. On the theoretical side, philosophy has three branches—physics, mathematics and metaphysics.

The concepts of Ibn Sina's *Canon*—four causes, elements, temperaments, humours, faculties and forces all derived from philosophy, physics and biology of ancient times—are such that they provide the topics and terminology which appear to be rather confusing to the student of modern medicine. These are expected to be taken for granted by medical practitioners just as concepts of space, time, matter, motion, cause and effect are accepted without questions by physicists.

Aristotle had said that complete knowledge of a thing is possible only if we learn firstly, about its 'material' or the stuff of which the thing is made; secondly, the 'efficient cause' which moulds it; thirdly, the 'formal cause' which determines its shape and quality; and fourthly, the 'final cause' or functions for which the thing is made. With the concept of elements symbolizing the qualities of both mass and energy at the same time, Ibn Sina, in his *Canon*, introduces us to a theory of interaction between the four causes and thus establishes not only the unity between organs and their functions in the body but also brings the outer world into appropriate space-time relationship.

According to Gruner, human body is a material but visited by the vital force—a life principle, organized from the humours (p131). Psyche is a differential of the vital force, expressing itself as mind at cognitive level and as emotions in the heart and thus a part and parcel of the body.

The above mentioned concept of causation also implies that the internal organs belong to one another beyond the anatomical limits. The heart to modern anatomy is a circumscribed organ: to the canon, it is a part of a force occupying the whole body. To synthesis ancient with modern knowledge, the physical heart, the arterial vessels containing blood and the autonomic nervous system including its hypothalamic centers are one great composite of the functional heart the operation of which pervades the whole body. Finally, it is the *nafs* or *anima* which, in accordance with the nature of an organism, acts as the ultimate determinant or formative factor for its growth and activity.

It is with the help of these concepts that Ibn Sina offers a constitutional approach according to which every illness of a person is to be regarded as a product of (a) an inheritance—the stuff or material he is made of; (b) the kind of temperament, structure and strength of faculties he has; (c) the type of factors operating on him from outside; and (d) nature's own attempt at the maintenance of his life functions.

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CHAPTER 11

Unani Medicine: Hakims and their Treatises

Altaf Ahmed Azmi

Muslims began to enter India as early as in the seventh century A.D., but they were mainly Arab merchants who visited the coastal areas of Malabar for business purposes. Proper establishment of Muslim rule in a part of the Indian sub-continent, however, came up only in the eighth century during the reign of Caliph Walid bin Abdul Malik (705 -715 A.Dg.) when Mohammad bin Qasim conquered the coastal areas in Makran (Sind Province). The matter rested there for a long time and there was no further expansion of Muslim rule. Subsequently, Mahmood Ghaznavi (998-1030) invaded the Punjab and a number of cities in northern India, but his rule was confined practically to a few areas of the Punjab. The last Ghaznavi ruler was Khusrow Malik (1150-1186), with Lahore as his capital. During this invasion, possibly a number of physicians might have arrived in the conquered areas of Sind as well as the Punjab, and settled there, although there are no records either about their arrival or the medical works compiled by them. However, it is desirable to refer to some statements which are made by certain authors about important Hakims of that time.

The first Unani physician, whose name is found in Indian history, is Ziauddin 'Abdal-Rafi' Hirwi, a court physician of Sultan Khusrow Malik. According to the author of *Maathir al-Umara'*, he was regarded as a skilled and eminent physician even during the rule of Shahabuddin Mohammad Ghowri (d.1206 A.D.).[1] As regards his expertise, Nuruddin Muhammad Awfi writes:[2]

" 'Abdal-Rafi' was a world of knowledge and perfection, a man of skill, a heaven of greatness and excellence, and unique in grace and kindness. He was well-versed in medicine (Tibb) and had a profound knowledge of languages. He had a healing hand and miraculous power of disposition. He was held in great esteem and honour at the court of Khusrow Malik."

The development of Unani medicine in India can be divided into four broad periods: (i) The Sultanate period; (ii) The Deccan period; (iii) The Mughal period; and (iv) The post-Mughal period.

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Medicine during the Sultanate Period

The Sultanate period starts with the accession of Qutbuddin Aibek, a slave officer of Sultan Mohammad Ghowri, to the throne of Delhi after the death of his master in 1206. During this dynasty, called the Slave Dynasty (1206-1290), the development of Unani medicine was meagre owing to the constant fierce struggle for the occupation of the throne of Delhi, the consolidation and expansion of the dynastic rule. The rule of Iltutmish, however, is an exception in this regard. During his rule, we come across a medical work, *Kitab al-Saidla* (Saidna) by Al-Biruni, which was translated by Abu Bara b. Ali b.Usman Asfar al-Kashani[3] from Arabic into Persian, the first medical translation rendered in the Sultanate period[4] and preserved even today.[5]

Besides, there was Hakim Shamsuddin, who was an experienced hakim during his reign. When Khwaja Qutbuddin Bakhtiyar Kaki (d.1236) fell ill, the hakim was called to treat him.[6] Ibn Batuta, the noted traveller, who was in Delhi during the Khalji and Tughlaq periods, has made a mention of Sheikh Fiqeeh Jamal al-Din Maghribi, a native of Garanata and famous physician during Jalal al-Din Khalji's reign. He accompanied Ibn Batuta, when he went to see the great palace of the Sultan in Delhi, named 'Koashek Lal'.[7] Hakim Fazlullah Mendevi was another renowned physician of that time. During the reign of Mahmud Shah Khalji of Mandu, he was made the superintendent of Dar al-Shifa (hospital) of Mandu in 1446. Mahmud Shah, in recognition of his medical accomplishment, bestowed on him the title 'Hakim-al-Hukama'.[8]

The development of Unani medicine was more prominent during Alauddin Khalji's reign (1296-1316) than in the earlier periods of the Ghaznavi, Ghowri and the Slave dynasties. Alauddin Khalji came to power in 1296 after killing his uncle, Sultan Jalal al-Din, by treachery. In spite of this shameful crime, the reign of Alauddin is praiseworthy from many angles. He was an exceptionally good ruler endowed with a number of royal qualities and expanded his rule even to the south. During his rule, the State was free from unrest and revolt of the nobles. His army was so powerful that he successfully repressed many Mongol raids over the borders of India. He prudently kept the prices of essential commodities at a reasonable level and every thing was available in adequate quantity in the market. Expectedly, the political stability and economic prosperity during his period attracted a large number of men of learning and scholarship from Iran and Central Asia. The famous historian, Ziauddin Burni, has recorded as follows:[9]

'The likes of the matchless men of letters and scholarship present in Delhi could not be found in Samarqand, Baghdad, Egypt, Khwarizm, Damascus, Tabriz, Isfahan, and Ray, rather in the whole inhabited world'. Burni has also given an account of Unani physicians of this period as follows[10] : 'Atibba (physicians) of the Ala'i period had a complete skill in medicine, and there can be no comparison between them and Hippocrates and Galen in the treatment of diseases. Such distinguished physicians were neither seen before nor would be found in the coming times.'

The noted physicians, who flourished in the days of Alauddin Khalji and who deserve special mention, include the Hakims:[11] Maulana Badruddin Damishqi, Hisamuddin Marikali and his son Sadruddin Marikali, Matraz, Alimuddin, Yamani Tabib (physician of Yemen), A'izzuddin Badayuni, Mahchander, Jaja, the surgeon (*jarrah*) and 'Alimuddin,

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the oculist (*Kahhal*). All the physicians of the city used to take lessons on the *Tibbi* book from him (Maulana Badruddin Damishqi). God had bestowed such skill and capability on him that he could judge the cause of the disease just by feeling the pulse of the patient and predict whether he was curable.[12]

It has been recorded that Badruddin Damishqi was so adept in the examination of urine that by just looking at it he could tell whether it was human urine or that of animals and also of which animal. Farishtah writes:[13] 'Master-physician Maulana Badruddin Damishqi was one of those life-giving physicians who could name animals even if the mixed urine of some animals was brought to him for examination and he would do so just by looking at the urine. Further, the author of a work titled *Nuzhat al-khawatir* acknowledges the extraordinary knowledge and skill of Maulana Damishqi in these words:[14] 'He was an unequalled physician of his time in skill, counselling, pulse-feeling and examination of urine. It is said that once a sample of urine mixed with the urine of different animals was brought to him. As soon as he looked at it, he smiled and said, the urine had been brought to him after mixing with the urine of a few animals. The Maulana was unique in oration and making people understand his viewpoint. He had the ability to instil complicated medical problems in the mind of students easily. He had attained exceptional skill in expounding *al-Qanun* written by Ibn Sina'.

The same author also states about another physician, Hakim Sadruddin (son of Hisamuddin Marikali), as follows:[15] 'He had profound knowledge of theology. He used to practise medicine during the reign of Sultan 'Ala'uddin Muhammad Shah Khalji in the capital, Delhi. Apart from running his clinic, he also used to teach tibb. He was a very intelligent, clever, skilful, and good-natured physician. He used to learn the cause of ailment just by looking at the patient and they were cured quickly by his treatment'. Burni testifies that [16] 'both the father and the son were experts in tibb (medicine). Hakim Sadruddin was a very good-natured physician. He used to diagnose the ailment and its cause by just having a look at the patient'.

Burni also takes note of Hakim Matraz in these words:[17] 'Like Hakim Badruddin Damishqi, he was such an expert in pulse-feeling and examination of urine that no other physician of Delhi could rival him. God had also bestowed on him the power of eloquence. He used to explain the subject matter and problems of *Qanun* (Ibn Sina), *Qanuncha* of 'Allamah Chaghmani and other medical works such that the students were stunned at his lucid speech and novel method of explanation'.

As already mentioned, Hakim Yamani was dexterous in tibb. The author of *Nuzhat al-khawatir* writes about him:[18] 'He was an extremely skilful physician who was engaged in teaching and service to humanity in the city of Delhi during the reign of Sultan 'Ala'udddin Muhammad Shah Khalji'. The same author writes that Hakim 'Alimuddin Shirazi 'was extremely knowledgeable in philosophy and science of medicine and he used to teach in Delhi in the days of Ala'uddin Khalji'.[19]

Tughlaq Dynasty

As in the days of 'Alauddin Khalji, Unani medicine made notable progress during the Tughlaq dynasty. Its founder, Ghiyasuddin Tughlaq Shah (1320-1325), was not only

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interested in the development of tibb but also achieved proficiency in it. After his victory over Khusrow Khan, he himself bandaged the wounded soldiers and treated them. Hakim Nayyar 'Ali Wasti writes:[20] 'It is narrated about Ghiyasuddin Tughlaq that he himself treated the wounded personnel of the enemy after his victory over Khusrow Khan. There was one person by the name of Tamar among the wounded army men whose wounds were bandaged by Ghiyasuddin himself.'

Mahmud 'Adil Tughlaq Shah, known as Muhammad b. Tughlaq (1325-1351A.D.), the elder son of Ghiyasuddin Tughlaq, who succeeded his father to the throne of Delhi, was a virtuous and learned king. In addition to the other scientific subjects, he had a deep knowledge of tibb, and was particularly skilful in the treatment of several diseases, curing a large number of patients. Besides, he used to hold discussion sessions with expert physicians frequently and try to convince them about his viewpoint.[21]

Hakim Khawaja Shamsuddin Mustaufi and Hakim Zia Mohammad Masud Rashid Zangi Umar Ghaznavi *alias* Mubarakbad were the court physicians of Sultan Mohammad b.Tughlaq. The former wrote a book *Majmu ah-i Shamsi* with the help of Sanskrit sources. Nothing is known, however, about the life of the author except that he was the uncle of Hakim Ziya Mohammad, the court physician of Sultan Mohammad b. Tughlaq and the author of *Majmu ah-i Diai'*. [22] Nor, unfortunately, is the date of compilation of this important book known as it is no longer extant. In fact, this work came to light through other books as evidenced by Hakim Amanullah Khan who has given a list of his sources in the preface to his work, *Ganj-i Bad Avard* which mentions it as one of his sources. Since Hakim Amanullah died in 1637, it is assumed that *Majmu ah-i Shamsi* was available up to the seventeenth century, although, so far no scholar has pointed out its availability in any library in India.

Zia Mohammad also compiled a medical book, *Majmu 'ah-i Diai*. He was fully conversant with Arabic and Persian as well as Sanskrit sources. This book was written during his stay in Tilang[23] (Devagiri or Daulatabad) where he had migrated from Delhi with other distinguished dignitaries by the command of the Sultan. The writer has described his migration and the new capital in these words:[24] "The humble author, Ziya' Muhammad Mas'ud Rashid Zangi 'Umar Ghaznawi *alias* Mubarakbad, says: 'By the order of Sultan Muhamad Tughlaq, I arrived in the city of the Sultan called Tilang in the year 737 A.D./1336 A.H. and saw that it was a large, beautiful and fascinating and fertile city, full of numerous delicacies and fruits, and there were ponds and running streams all over the city." *Majmu ah-i Diai* was written in 1336 and, like the other books written in the pre-Mughal period, deep influence of Ayurveda is reflected in this book, too. For this reason, the author has given Hindi names of diseases and drugs instead of the Arabic and Persian names. As he was well-versed in Sanskrit, he made full use of Sanskrit medical literature and this becomes clear, where he has dealt with the process of making calces (calcination), surgery and even astrology.[25] It also has an account of horse diseases [26] as well as an account of the nature and temperament of women from various parts of the country which is quite interesting. In short, *Majmu 'ah-i Diai* is a pleasant mixture of Unani medicine (tibb) and Indian medicine (Ayurveda).

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Hakim Sheikh Ziauddin Nakhshabi was also a well-known Sufi physician during Mohammad b. Tughlaq's reign. He came to India after the destruction of Baghdad (1258), settled in Badayun and died there in 1351. Among his medical works are: (i) Tuti Nama (complied in 1330); contains references to Sanskrit medical texts and consists of 40 chapters; (ii) Lazzat al-Nisan (translation of Kokh Sastra in Sanskrit), extant in the Salar Jung Museum, Hyderabad (A.P.); and (iii) *Al-Juziyat wa al-Kulliyat,* compiled in 1330 in a mystic style and also has a descriptive name of Namus-i Akbar. The author has used the word, *Namus*, for the usual word, *Fasl* (chapter), and divided the book into 40 *Namus*. In every chapter, he has discussed the shape of a particular organ or limb of the body, the connected diseases and their treatment. A manuscript copy is extant in the Maulana Azad Library of the Aligarh Muslim University, Aligarh, another manuscript being available in the National Museum, New Delhi.

After Muhammad b. Tughlaq, Firoz Shah Tughlaq (1351-1388) ascended the throne. Besides theology, he had mastered in tibb and astronomy, and had a treasure of books on these subjects in his personal library. His book *Tibb-i Firoz Shahi*, bears ample testimony to his knowledge and skill in medicine. In this treatise, Firoz Shah has given details of the treatment of ailments, which have not been covered even in *Al-Qanun* of Ibn Sina and *Dhakhira-i Khwarizmshahi* of Isma'il Jurjani. He was a specialist in joining fractured bones. It is said that he joined the broken bones of a large number of warriors associated with his army in many campaigns in a surprising manner. He also had a good knowledge of ophthalmology. Antimony compound (collyrium) made by him and known as 'Surmah-i Firoz-Shahi,' proved very beneficial in curing many eye diseases.[27]

The manuscript of *Tibb-i Firoz Shahi* is not, however, found in any library in India. A treatise, *Sirat-i Firoz Shahi*, contains a portion of that book spreading over thirty pages (folio 163-78). Another book, compiled by Shah Quli, during the reign of Bulban (1266-87) is also known as *Tibb-i Firoz Shahi*, which deals the treatment of birds.[28] But the name of the book is misleading because before Firoz Shah Tughlaq no other Sultan by this name is found associated with this title. It is, therefore, presumed that the name of the book is not correct and the scribe during the reign of Sultan Firoz Shah changed the title of the book and wrongly ascribed it to Sultan Firoz Shah.

An important medical book composed during the reign of Firoz Shah is known as *Rahat al-Insan*, which was written by Hakim Ilyas b. Shahab surnamed *Zia*. Some manuscripts mention only *Ziya'* b. Shahab. The manuscript consulted by us also gives the latter name.[29] Written in 1377 and dedicated to Sultan Firoz Shah, this book has three sections and 74 chapters as mentioned in the preface by the author himself as follows:[30] "It was written on 2nd Muharram, 778 A.H. at the instance of the world-protecting master, Abu Muzaffar Firoz Shah, the Sultan; may his country and kingdom ever remain under the security and mercy of God, and this compendium was named *Rahat al-Insan* which comprises three sections and 74 chapters".

The influence of Ayurveda is quite prominent in this book. Describing *Tap -i-Sawdavi*, he writes:[31] "*Tap -i-Sawdavi* is called *pat jar* in Hindi". He has mostly given the Hindi names of drugs along with Arabic and/or Persian names. For example, the prescription for Tap-i Sawdavi says:[32] "Take Satawar- 3 diram; Kulvi-3 diram; and Bansa-3 diram.

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pound or grind each item, mix them and boil in 6 bowls of water until one bowl of the material remains'. An interesting point in this book is that the author has given drugs as well as amulets for every disease, thus pointing to the fact that people were extremely superstitious during the period. The author also writes that the contemporary Unani physicians (*atibba'*) were at a loss to treat many diseases. In the words of the author:[33] "Conditions prevailing in my era are quite different. Today, the situation is that the temperament changes every hour and the physicians also take the characteristics of olden times as a means of argument and reason and consider all the words of the patient as sufficient and begin the treatment. It does not prove much beneficial. The reason is that these days most people are suffering from the effect of evil spirits. Since they are caught in this superstition, they imagine that they are under the domination of demons, fairies and the like, even if they suffer from different ailments. God has made them the prisoners of that calamity and the physicians are totally ignorant of that knowledge". Nevertheless, the author has also given some talisman (on ff. 113,114 and 115) which is quite strange. In any case, the study of this book provides not only medical information but also reveals the attitude of people in those days.

A notable feature was that there were a large number of hospitals in different cities in the Tughlaq period. According to Elliot, there were 70 hospitals in Delhi alone during that time.[34] Firoz Shah Tughlaq also established some new hospitals during his reign. Farishtah writes:[35] "The king constructed 50 dams, 40 mosques, 30 schools, 20 monasteries, 100 palaces, 115 hospitals, 100 mausoleums, 10 public baths, 150 wells, and 100 bridges, as well as a large number of gardens. He established endowments for their maintenance". Firoz Shah himself has given an account of a hospital in *Futuhat*, in which patients suffering from all types of diseases were treated free of charge, by experienced physicians whom he had deputed for this purpose.[36]

Describing the interest of Firoz Shah in tibb and his deep sympathy for patients, 'Afif writes:[37] "The king had built a hospital for the treatment of patients in which people were treated without distinction of creed and nationality. He had appointed physicians to work in it. Under the order of the king, the patient was examined as soon as he arrived and suitable medicines given after the correct diagnosis of his ailment, and that full sympathy shown to the patients. In addition to these physicians, it had specialists for curing particular diseases. It also had surgeons, oculists and other staff. Medicine and food were given free to the patients. After recovery, the patients used to thank god, offer thanks-giving Namaz (prayer) and pray to god for long life and good fortune of the king. Therefore, they used to go home hale and hearty. The king had endowed a large number of villages for the expenses of this hospital. The annual income from those villages was 36,00,000 tankas."

The author of *Sirat-i Firoz Shah*[38] has given the details (ch.IV) of various simple and compound drugs kept by himself in the hospital for the treatment of patients. He also states that the king used to visit the hospital and write prescriptions for the patients. He had ordered that the mental patients should be brought in, kept chained in the hospital and treated by drugs and food prescribed by him.[39] The study of this book shows that only skilful physicians were appointed for the treatment of patients in the hospitals established

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by the king.[40] Besides, Firoz Shah established a number of *madrasas*[41] (educational institutions, and there were as many as thirty schools in Delhi, Madrasa Firoz Shah at Hauz Khas, being one of them. In this school, besides religious texts, mathematics, astronomy and medicine also were taught).[42]

Lodhi Dynasty

Unani medicine made substantial progress during the rule of Lodhi dynasty (1451-1526). Sikandar Lodhi (1489-1517), a learned and farsighted king, had a profound, deep knowledge of Persian and used to write verses in Persian under the pen name 'Gul Rukh'. He was also interested in music as is evident from his book *Ganjinah-i Sikander Shahi*. More importantly, he had an extraordinary zeal for medicine. He ordered his learned minister, Bahwa b.Khawas Khan, to write a book on Ayurveda covering its theory, principles, and methods of treatment. In order to implement this order, the latter wrote a book entitled *Ma'dan al-Shifa'-i Sikander Shahi*.

Bahwa Khan felt that the treatment originating in Greece (Unan) did not suit the temperament of Indian people. Most of the Unani drugs were not produced then in India and those which were produced here were unfamiliar. On the contrary, he used to consider Ayurvedic treatment as suitable for the temperament of this land. The same was the thinking of the King.Therefore, Bahwa Khan compiled his book *Ma'dan al-Shifa'-i Sikandar Shahi* in 1512 with the help of learned *vaids* (Ayurvedic physicians), as well as several Ayurvedic books of Caraka and Susruta, Jatukarna, Bhoja, Bhela, Madhava, Vagbhata, Nagarjuna, Nagasena, Cintamani,Gayadatta and others. He reverentially dedicated his book to Sultan Sikandar Lodhi. This treatise has one preface and three sections(*Abwab*). The preface deals with the definition of the science of medicine (*Ilm-i tibb*) and its importance as well as the basic principles and doctrines of Ayurveda. A brief account of its contents gives an insight into the nature and structure of this book.

Section I discusses generalities in 32 chapters as follows: (i) To learn Ayurveda from able and expert physicians; (ii) Stages of treatment; (iii) Seasons and tastes (*rasa*); (iv) Description of the production of medical and surgical instruments needed by physicians and surgeons; (v) Account of various types of surgical actions; (vi) Pre-surgery arrangements; (vii) Questions which should be asked by a physician at the time of examination of the patients; (viii) Method of using leeches for the treatment of different ailments; (ix) Benefits of different kinds of drink; (x) Good and bad effects of different types of food; (xi) Preparation of 38 electuaries (*Majoon*—a compound drug used in various diseases, their actions and properties); (xii) Bad effects produced by excess and/or deficiency of three humours (*tridosa*); (xiii) Diseases caused by excess and domination of three humours and blood; (xiv) Signs and symptoms to judge whether the patient would be curable or not; (xv) Signs and symptoms to determine whether the health of the patient will be restored or not; (xvi) Description of drugs and medicines which expel putrefied humours, and drugs which rectify; (xvii) Weights and measures; (xviii) Names of certain drugs which are in general use by Indian physicians; (xix) Sphygmology (pulse-feeling); (xx) Description of drugs which stimulate vomiting;

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(xxi) Purgatives, their composition and preparation; (xxii) Account of antidotes of poisons; (xxiii) Basic things which a physician should know before beginning the treatment; (xxiv) Signs to know the dominant element of earth; (xxv)Different kinds of tastes and their actions; (xxvi) Description of things which are both beneficial and injurious; (xxvii)Drugs which are beneficial in the treatment of swellings, blisters and tumours; (xxviii) Description of tested medicines and drugs for the treatment of particular diseases; (xxix) Description of iron tools and instruments for particular surgical operations; (xxx) Instructions regarding the care of injured persons; (xxxi) Properties and actions of three humours; and (xxxii) Description of blood and other fluids of the body.

Section II of this work in its 9 chapters deals with the creation of human beings and anatomy of the body: (i) Account of semen of man and menstrual discharge of women; (ii) Conception; (iii) Creation of foetus and formations of different limbs; (iv) Description of limbs and organs, and the number of their parts; (v) Important and vulnerable parts of the human body; (vi) Number of veins and their functions; (vii) Instructions and directions about phlebotomy (blood letting); (viii) Points of origin of veins and their branches; and (ix) Devices for the maintenance of health and hygiene of pregnant women.

Section III has 87 chapters, devoted to signs and symptoms of diseases and their treatment.

Amir Miyan Taha, another minister of Sikandar Lodhi, was well versed in Islamic sciences as well as in Ayurveda and music. It is on record that he had learnt by heart as many as 24,000 verses on Ayurveda. He was so skilful in Ayurveda that even Hindu medical experts used to take lessons from him on Indian medicine.[43]

Around this time, no sooner did the central Muslim authority begin to weaken, than a number of independent kingdoms rose at the cost of the Delhi Sultanate. These included Jaunpur, Gujarat, Bengal, Malwa, Kashmir, and in the south, the Bahmani kingdom and the Vijayanagar empire. The development of Unani medicine in Gujarat is presented here.

Unani in Gujarat

The Muslim rulers of Gujarat, who were generally great patrons of art and literature, took keen interest in medicine, too. During the reign of Muzaffar Shah, Shihabuddin Abdul Karim Nagawri was a noted physician. He wrote three medical treatises entitled *Shifa' al-Khani*, *Tibb-i Shahabi*[44] and *Farhang-i Shahabi*.[45] The first was written at the command of Muzaffar Shah, as the author himself writes:[46] "It was directed by the king that a few chapters be written on the science of medicine (tibb) which has already been preserved. Although there are many physicians in the court of the bright, intelligent and learned king whose threshold is as high as the sky, where the learned scholars of theology also stand always for service, the great favour was showered on me. Thus, by the order of exalted throne, may it remain for ever, I wrote a few detailed chapters on the principles of tibb based on a few reliable books, in simple language, mentioning simpler drugs, some tried and some considered by me as suitable. This book was named *Shifa' Khani*." Nagawri completed his book in 1392 consulting Arabic, Persian, as well as Sanskrit

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sources. He has suggested only those drugs that were then easily available, and refrained from prescribing costly medicines. The prescribed doses are so small that the patient could take them comfortably. Sanskrit and Sindhi names of some drugs have also been given in this book.

The second treatise of Nagawri, *Tibb-i Shahabi*, is also known by its other name, *Shifa' al-Marad.* It is a versified medical tract which was completed in 1388. In the words of the author, "it describes only those drugs which have been fully tested. It contains a brief account of the causes, symptoms and treatment of human diseases. It also throws light on the nature and actions of certain drugs and food." At the end of the book, the author furnishes some information about himself. Some of the verses are quite interesting and serve as lessons, particularly the verses concerning the impression about the nature of Hindus and Muslims of his time:

"In this world, I found faithfulness in Hindus and I sought retribution on behalf of Muslims from God. The infidel had not given me wealth (treasure) in secret that the Muslims spoiled necessarily my wealth. When a Hindu suffers from any ailment, he goes to a reliable physician,and he does not disobey his orders regarding precautions etc. He gets well after some time and accepts him as his master for all times to come, and if he dies during treatment, he renders greater service to the physician by his magnanimity (and says) that this man did his utmost to restore him to health but as if was predestined by God, the medicine did not prove beneficial."

"Now, when a Muslim gets afflicted by disease and brings his urine to me for diagnosis, by God, I treat him with full attention and I give him tested medicine and advise precautions. But if I ask him to take honey, he would drink butter-milk, and if I ask him to take rice, he eats pottage. If he survives, they say that it was the grace of God which saved him and if he dies, they say that he was killed by the physician. This is the position of the (followers of) Islam in this region and I do not know about other places."

Nagawri's third treatise, *Farhang-i Shahabi*, is a medical dictionary as is evident from its name. It has names of medicines in Hindi along with Arabic and Persian names e.g. Basal (Arabic)= Piyaz (Hindi) and Bilador (A)= Bhalawan (H). This dictionary is unfortunately incomplete and has 12 folios only. The book, *Maathir-i Mahmud Shahi*, has also been attributed to the Hakim by some scholars,[47] but it is doubtful and has to be verified.

During the reign of Sultan Mahmud Shah Begarah, Unani medicine made further advancement. He was very intelligent and sharp in his judgment. Though he had no systematic education, he was well-versed in every branch of knowledge because of his deep association with learned persons. Ibn-i Ashraf, in his translation of the *Shifa'* of Qazi Ayaz, has mentioned at several places about the Sultan's extraordinary quick judgment and legal decisions. He used to converse with learned men and experts on religious, historical, literary and other subjects with exceptional confidence much to their surprise.

He was keen on the Persian translation of Arabic works. The well-known biographical dictionary of Ibn-i Khallikan (*waffiyat al A'yan*) was rendered into Persian by Yusuf b.Ahmad under the title of *Manzarat Insan* and dedicated to Mahmud Begarah.[48] He also patronized Sanskrit. The famous Sanskrit medical work *Astanga hrdaya*, by the

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distinguished Indian physician *Vagbhata,* was translated into Persian under the title of *Shifa'-i Mahmudi* or *Tibb-i Shifa'-i Mahmudi* by 'Ali b.Mohammad Isma'il Asawali Asili, at the order of Sultan Mahmud Shah.

This book has six sections called *Astanga* and 120 chapters: The sections of the book are: (i) Preface (*Suter Astanga*); (ii) Anatomy (*Sharir Astanga*); (iii) Causes of diseases; (iv) Treatment of diseases; (v) Pharmaceutics; and (vi) Treatment of remaining diseases (*Atar Astanga*). The first *Astanga* in 30 chapters deals with the fundamental principles of Ayurveda. The title of the first *Astanga* is: Ways to protect (prolong) life and age. The second *Astanga* (6 chapters) describes anatomy of the body. The third *Astanga* (16 chapters) is on the causes of diseases, while the fourth (22 chapters) gives an account of the treatment of diseases. But the treatment of some diseases described in this section is rather astonishing. For example, regarding the treatment of stone in the bladder, it says that it can be extracted after breaking it with an instrument, but it can be done by an experienced surgeon only because of its being a very delicate operation. It also gives another method for removing stone. The reason given in this work for the formation of bladder stone as due to the suppression of semen is not only incorrect but surprisingly wrong. The fifth *Astanga* (6 chapters) describes pharmaceutics, whereas the sixth *Astanga* (40 chapters) deals with the treatment of those diseases that are not covered in the third *Astanga*. As the translator says: "Concerning the treatment of remaining diseases not described in *Hakjhat* it amounts to 'Conclusion', and it is named *Atar Astanga* and has 40 chapters." The heading of the first chapter of the sixth *Astanga* is 'Children's diseases and their treatment', and its last eight chapters (33-40) deal with drugs.

Medicine during the Deccan Period

A number of independent kingdoms arose during the last days of the Delhi Sultanate, the Bahmani Kingdom of Deccan, and the Vijayanagar Empire in the south being the most powerful among them. The former was the government of Muslims and the latter was that of Hindus. Bahmani kingdom was founded by 'Alauddin Hasan Gangu (1347-1358).

The name of Mahmud Gawan is worth mentioning here since he was the prime minister of Mohammad Shah (1463-1482). The Bahmani kingdom had reached its zenith during the days of Mahmud Gawan who was a learned man, well-versed in mathematics and medicine. He established a big centre of learning (*Madrasah*) in Bidar whose ruins are still there reminding us of its past glory. After the death of Mahmud Gawan, the Bahmani kingdom began to decay and finally came to an end in 1527.

The nature and the extent of the development of Unani medicine in the Bahmani kingdom is not known, although Hakim Nasiruddin Shirazi and Khawaja 'Amaduddin Mahmud 'Ali Gilani were the famous physicians of this kingdom. The Qutb Shasi Dynasty of Golkunda, among the enlightened Muslim monarchs of Golkunda, a splinter state of Bahmani kingdom Mohammad Quli Qutb Shah (1580-1611), Mohammad Qutb Shah (1611-1625) and 'Abdullah Qutb Shah (1625-1672), were the lovers of art and medicine. Under their patronage, architecture and medicine took rapid strides. It may be noted that the beautiful city of Hyderabad was built during the reign of Mohammad Quli Qutb Shah.

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In 1595, he also built a magnificent hospital, *Daral-Shifa'*, on the bank of the Moosi river. A historian has written about this building as follows:[49] "The minor courtyard of the building is of about 175 square feet. It is a double-storeyed building of which the eastern, western and southern wings have double rooms on the ground floor and the same number on the first floor, while the northern wing is taken up by a gateway, and 8 double-rooms on the ground floor and the same number on the first floor." *Daral-Shifa'* was not only a hospital but also a teaching centre. It had the capacity for treating 400 patients at a time, and the diet and medicines were provided by the hospital. Many learned and experienced physicians were employed there to treat patients and impart medical education to students.

Among the famous physicians of the Qutb Shahi dynasty, the names of Mir Mohammad Momin, Shamsuddin 'Ali Husain al-Jurjani, 'Abdullah Tabib, Shamsuddin b. Nuruddin Tabib, Saiuddin Muhammad Tabib Gilani, Taqiuddin Muhammad b. Sadruddin and Hakim al-Mulk Nizamuddin Ahmad Gilani are noteworthy. Their life profiles and works are briefly presented below.

Mir Mohammad Momin 'Ali al-Husaini was born around 1552 in Iran. The famous Safavi ruler, Shah Tahmasp (1524-1576), had appointed him a tutor to his son. This clearly speaks volumes about his learning and scholarship. Due to unknown reasons, he left Iran in 1581-82 and reached Golkunda. Within a short time, he became so popular that Mohammad Quli Qutb Shah (d.1612 A.D) turned his attention towards him and appointed him the Peshwa of the Kingdom.

Mir Momin, a talented literateur and erudite, was also well-acquainted with the Unani medicine and wrote two treatises: (i)*Ikhtiarat-i Qutb Shahi*; and (ii) *Risalah-i Miqdariah*. The former is a critical study of the well-known medical treatise, *Ikhtiarat-i badi'i*, which was compiled by Zaynuddin 'Ali b. Jamaluddin al-Husayni Ansari, known as Haji Zayn al'Attar[50] (1330-1403). This popular work, deals with simple and compound drugs and it was frequently consulted and referred to by Unani physicians during that time. But, despite its popularity and wide acceptability, it was found to have certain shortcomings, which compelled Sultan Quli Qutb Shah to order Mir Momin to revise and re-write the book with the help of expert physicians, removing its discrepancies thereby adding new useful information.

Two copies of this manuscript are extant in the Salar Jung Museum Library, Hyderabad. The first copy has 453 folios and was transcribed by 'Arab al-Shirazi. The second copy consists of 488 folios and was transcribed by Nizam b.'Abdullah al-sa'di al Shirazi in 1630 at the instance of 'Abdullah Qutb Shah. The *Risalah Miqdariah* is a small treatise which deals with weights and measures. During the reign of Quli Qutb Shah, a great deal of confusion prevailed about different weights and measures. The Sultan ordered Mir Momin to compose a comprehensive and authoritative book on the subject so that the confusion could be removed in certain religious affairs as well as in medicine. After studying many religious and medical sources, Mir Momin compiled this book, two copies of which are extant in the Salar Jung Library, Hyderabad. One of them is the personal copy of the author himself. It contains 16 folios.

Shamsuddin 'Ali Husayn al-Jurjani was a reputed ophthalmologist. At the behest of the Sultan, he rendered into Persian the Arabic manual on ophthalmology, *Tazkirah al-*

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Kahhalin (Memoir of Oculists), written by 'Ali b. 'Isa Kahhal of the eleventh century, and dedicated the translation to the Sultan. Shamsuddin is reported to have introduced Arabian ophthalmology into India for the first time. A copy of this translation is preserved in the Salar Jung Museum Library, Hyderabad. It has 77 folios and was transcribed by Farzand Husayn in 1877. It consists of three discourses (*Maqalat*). The first discourse (21 chapters) discusses the anatomy and physiology of the eye; the second one (73 chapters) deals with the external diseases, their causes, symptoms and treatment; and the third one describes the internal diseases of the eye, their causes, symptoms and treatment.

'Abdullah Tabib was another famous physician who flourished during the reign of Sultan Mohammad Quli Qutb Shah. He is the author of a medical work titled *Tibbi-i Farid* and dedicated to the Sultan. This deals with hygiene (*Hifz-i sihhat*) as well as the treatment of diseases from head to foot through the intake of proper foods and simple drugs. It is extant in the library of Nizamia Tibbiya College (Hyderabad), Khuda Bakhsh (Patna), and the Bodlean Library (Oxford).

Another noted physician who was attached to the court of the Sultan was Safiuddin Muhammad Tabib Gilani. He composed a treatise entitled *Tazkirah al-Shahwat fi Tabsirat al-Lazzat*, which deals with the subject of sex, and is divided into a preface, seven discourses and a concluding statement (*Khatimah*). The manuscript of this work is available in the Riza Library (Rampur) and the State Central Library, (Hyderabad).

The court physician of the Sultan, Shamsuddin b.Nuruddin Tabib, composed a short treatise in Persian under the title *Zubdat al-Hukama'* in which he has discussed the basic principles of the preservation of health, laying emphasis on the fact that proper and balanced use of food sustains health, while its improper use leads to diseases. The author dedicated his treatise also to Muhammad Quli Qutb Shah. It is preserved in the Asiatic Society Library (Calcutta), the Salar Jung Museum Library (Hyderabad), Nizamia Tibbiya College Library (Hyderabad), and Government Orient Manuscripts Library (Madras). The manuscript in Salar Jung Museum contains 60 folios and divided into a preface and four discourses.The preface deals with the principles of health. The first discourse discusses the six essential causes (*Asbab-i Sittah-i daruriyah):* the second describes the methods for maintaining health in different seasons; the third is on the problems of eye; and the fourth is related to different foods and drinks, their properties, advantages and disadvantages.

Yet another accomplished and experienced physician during that time was Taqiuddin Muhammad b. Sadruddin. At the instance of the Sultan, he wrote a book entitled *Mizan al-Tabai'-i Qutb Shahi.* It presents an account of foods and drinks with special reference to the determination of the temperament of simple and compound drugs as well as the doses of some medicines and the like. Its manuscripts are available in the Salar Jung Museum Library, and the Asiatic Society of Bengal. The Salar Jung Museum's manuscript contains 254 pages and is divided into two sections: *Sughra* (minor) and *Kubra* (major), with *Natijah* (conclusion) and *Lazimah* (tribute).

Hakim-al Mulk Nizamuddin Ahmad Gilani was a celebrated physician and prolific writer who flourished during the reign of 'Abdullah Qutb Shah (1625-1672). He was born in 1585 at Gilan in Persia. He learnt medicine from Mir Muhammad Baqar Damad and

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Sheikh Burhanuddin, during the reign of Shah 'Abbas Safavi (1587-1629). He left Iran and came to India, but when and why are not known. Many historians[51] wrote that the Hakim was attached to the court of Mahabat Khan, the Commander-in-chief of the Mughal army during Shah Jahan's reign, when he invaded Daulatabad. The library of the Hakim was burnt by Mahabat Khan, out of sheer jealousy towards the Hakim; thus Hakim Nizamuddin left the company of Mahabat Khan and joined the court of 'Abdullah Qutb Shah at Hyderabad. The academic achievements of the Hakim will be dealt with later. The name of Isma'il b. Ibrahim Tabrezi is also to be mentioned here, although nothing is known about his life. A medical treatise named *Tazkirat al- Hukama'* is ascribed to him.

Nizam Shahi Dynasty of Ahmadnagar

Malik Ahmad (Ahmad Nizam Shah, 1490-1508), the Governor of Junnar, was the founder of the Ahmadnagar dynasty, and laid the foundation of the city of Ahmadnagar in 1574. Later, the reign of Burhan Nizam Shah (1508-1553) was remarkable for the development of Unani medicine. He was an enlightened patron of arts and medicine. Hakim Wali Gilani and Hakim Rustam Turjani were the famous physicians during the reign of Burhan Nizam Shah.

Hakim Wali Gilani learnt medicine from his father 'Alauddin Muhammad as well as from his uncle 'Alaudddin 'Ali, and compiled the following medical treatises: (i) *Taqwim al-Abdan*, (translation of Ibn Jazla's book); (ii) *Risalah Hifz-i Sihhat*; and (iii) *Taqwim al Amraz*. The first one, however, is found nowhere though the other two books are extant in the Asifiya Library and the Salar Jung Museum Library, respectively.

Rustam Jurjani came from Jurjan to India (Deccan) in 1544 but settled in Ahmadnagar. Owing to his vast experience in medicine and clinical farsightedness, he got entry into the court of Burhan Nizam Shah and was appointed his court physician. He composed three books on Unani medicine : (i) *Hummiyat*; (ii) *Asrar al-Nisan*; and (iii) *Zakhirah-i Nizam Shahi*. The last one was modelled on Ibn Baytar's work, *Kitab al-Jami' le Mufradat al-Adviya wa al-Aghzia*, and was completed in Daulatabad in 1547. As the name of the book indicates, it was dedicated to his patron.

This book is divided into two parts and includes compound drugs besides simple drugs in contrast to the work of Ibn Baytar. It consists of the following twenty chapters dealing with the drugs for (i) diseases of head; (ii) eye diseases; (iii) ear diseases; (iv) defects in eye sight; (v) oral diseases; (vi) throat and thoracic diseases; (vii) stomach and liver diseases; (viii) purgative and laxative drugs; (ix) anal diseases; (x) kidney diseases; (xi) urinary bladder diseases; (xii) diseases of reproductive organs; (xiii) diseases of uterus;(xiv) diseases of joints;(xv)cure of boils and swellings; (xvi) beautification; (xvii) fevers; (xviii) antidote drugs; and lastly (ix) weights and measures. The manuscript of this work is preserved in the Salar Jung Museum Library.

Hakim Qasim Beg Tabrezi, who was also a noted physician, was attached to the court of Burhan Nizam Shah and, after the latter's death, he became a court physician of his son, Hussain Nizam Shah (1553-1565). On account of political reasons, he left his court, went to Ahmedabad and died there in 1570.[52]

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'Adil Shahi Dynasty of Bijapur

The founder of 'Adil Shahi dynasty' was Yusuf 'Adil Shah (1489-1510). During his reign, many scholars and artists came to Bijapur from Persia and West Asia alike. This trend gained momentum during the reign of Ibrahim 'Adi Shah II (1580-1628). Mohammad Qasim Farishta, a well-known historian and physician, flourished during his reign. Farishta (1552-1623) was born in Astrabad in northern Persia and came to Ahmadnagar during the reign of Hussain Nizam Shah. He studied medicine under the supervision of able teachers like Hakim Muhammad Misri, Hakim Ahmad b. Nasrullah Sindhi and Cheter Bhoj Hindi. After acquiring the knowledge of medical and other prevalent sciences, he became the courtier of Murtasa Nizam Shah I (1565-1588), and after the death of Miram Hussain Nizam Shah II in 1588, he went to Bijapur and entered the service of Ibrahim 'Adil Shah II. He wrote a book titled *Ikhtiarat-i Qasmi* (see facsimile of preface on page 340) which is known as *Dastur al- Atibba*. Introducing his book he says:[53]

'The writer of these pages, Muhammad Qasim, entitled as Hindu Shah, commonly known as Farishta, studied the noble science of medicine as deeply as possible and spent a part of his valuable life on it. After the perusal of the books on the subject commonly used in Iran, Turkey and Arabia, his mind turned towards the study of the works of the Indian physicians. He found their theories as well as their practice of medical science extremely well-founded. He, therefore, thought it necessary to compile a book dealing with their system of treatment of diseases which at the outset appeared to be strange. For, there were many Muslim friends living in this country who had no thorough knowledge of the ever-changing climate of this country, nor were they well aware of the system of treatment followed by Indian physicians. In this book, therefore, he mentioned the properties of drugs and the victuals and their names which are difficult to pronounce. Thereby, he also wanted to leave behind something by which he might be remembered'.

It is clear from the above excerpt that *Dasur al-Atibba'* is mainly concerned with the principles and methods of treatment followed in the Indian system of medicine. This treatise consists of a preface, three sections and a conclusion. The preface discusses the fundamentals of Ayurveda, including *dhatus* (basic components of body), *dosa* (three humours i.e. *vata, pitta* and *kapha*); *tatva* (five basic elements); seven temperaments (three simple and four compound), treatment of diseases which are of two kinds, ten essential rules of examining a patient, which are to be followed by a physician; *rtu* (six seasons of the year); and the rules to be observed in the matter of food, bathing and indigestible foods and drinks.

The first section deals with 683 simple drugs as well as their actions and uses in the alphabetical order. Most of these drugs were in use by both the Unani and Ayurvedic physicians. The second section consists of 15 chapters that deal with medical formulations for different diseases. These are *mufarrehat*, *janarishat ma'ajin*, tablets, pills, powders, tooth powders, oils, mixture (*jowshandah*) ointments, enema and different kinds of syrups (*sharbat*) and the like. The third section is concerning about diseases and their treatment. It comprises 160 chapters, and each chapter describes a specific disease.

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بسم الله الرحمن الرحیم

حمد بیکنند زبیرا که بر حکم وما ارسلناک الا رحمة للعالمین رایات شوکت محمدی را رفع
ساخته م و در مخلوقات در دقیقه قدر وابواب رحمت بر روی خلایق
ساده حل و عقد مهام ایشان پیرا عالم آرای او مفوض گردانید و چون مدار نظام
جهان و معرفت خداوند ان موقوف بر صحت ابدان بنی نوع انسان است بر آنبه
ان شهرستان علم زبان فصح بیان باین کلام وحی نشان گویا ساخت العلم علمان
علم لابدان و علم الادیان از جمله میسود اوراق محمد قاسم استرابادی الملقب بهندو
شاه المشهور بفرشته دران علم شریف مهما امکن عور نموده برخی از خرگرانمایه
صرف کرد و بعد از مطالعه کتب این فن که در ایران و توران و عربستان متداول است
طبیعت راغب مطالعه کتب حکماء هندوستان که ویدچون علی و عملی طب ایشان
را و نهایت استحکام ثابت واجب و لازم دانست که جهت عزیزانی که بجهة
مسلم مزین بود دران و بار روزگار بسر می برند و از فصول و هوای کثیر الاختلال
اقامت بواجبی اطلاع ندارند و طرز معالجات اطبای ان ولایت چنانچه باید
نمیدانند علی الوقت کتابی مشحون از فواید و قواعد و ضوابط طبی
ایشان و تدبیر از الزام امراض که بحسب ظاهر خالی از غرابت نیست و تدبیر حفظ
و مزاج ادویه و اغذیه و اسامی انها که بلغت هندی

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Medicine during the Mughal Period

The development of Unani medicine during the Mughal period (1526-1800) contemporaneous with that of Safavids, is indeed noteworthy. All the literary works on Unani medicine, written during this period, have been more or less preserved, and they really surpassed those produced in the previous Sultanate period, both in form and content. Consequently, a brief account of the development of Unani medicine during the Mughal period is presented here chronologically.

Babur's Reign (1526-1530)

Zahiruddin Babur, after defeating Ibrahim Lodhi, the ruler of Delhi, at the battle field in Panipat in 1526, established the Mughal empire and died in 1530. During this short period, Unani medicine made significant progress.

Yusuf b. Muhammad b.Yusuf Herwi (d.1543), a renowned physician, writer, and the first physician during the Mughal period, wrote on Unani both in prose and poetry. He is the author of the following works: (i) *Asl al- Usul*; (ii) *Dala'il al-Bawl*; (iii) *Fawa'id al -Akhyar*; (iv) *Dala'il at Nabd*; (v) *Ilaj at Amrad*; (vi) *Jami'at Fwa'id*; (vii) *Qasidah Dar Hifz-i-Sihhat*; (viii) *Risalah Makul wa Mashrub*; (ix) *Riyad al-Adwiyah*; (x) *Sittah-i Daruriyah*; and (xi) *Amrad-i Chashm*.

Asl al-Usul: Written in the early 16th century, this is just a part of one of Herwi's important books in which he has laid down some qualifications and restrictions for the Unani physicians. A manuscript of this work is extant in the Maulana Azad Library of the Aligarh Muslim University. It has 8 folios, and this copy was scribed in Nasta'liq in 1839.

Dala' il al-Bawl: A treatise on the examination of urine, this was written in Persian in India in 1535. Its manuscripts are available in the Khuda Bakhsh Oriental Public Library (Patna), Asiatic Society of Bengal, Salar Jung Museum Library Nizamia Tibbiyah College (Hyderabad), and Riza Library (Rampur).

Dala'il at Nabd: This versified treatise written in Persian in India, deals with the diagnosis of diseases by examining the pulse of patients. The manuscript copies are extant in the British Museum, Asiatic Society of Bengal, State Library (Madras), Salar Jung Museum, Maulana Azad Library, and Khuda Bakhsh Oriental Public Library.

Fawa'id at Akhyar: It is a book on hygiene written in 1507. A manuscript of this versified treatise which has 24 folios is preserved in the Osmania University Library, Hyderabad.

'Ilaj al-Amrad: This treatise in verses was written in the early 16th century in Herat for the treatment of diseases. It has 289 quatrains and its manuscripts are available in the libraries of British Museum, Asiatic Society of Bengal, as well as in Maulana Azad Library, Riza Library and Salar Jung Museum Library (see fascimile of preface on pp. 342).

Jami' al-Fawa'id: This is a commentary on the above-mentioned treatise and written in Herat in 1508. The author has given an interesting account of the treatments of all

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بسم الله الرحمن الرحيم

حمد نامحدود حکیمی را که بقانون حکمت و کامل الصنعت رحمت رافع انواع
امراض و دافع اصناف اعراض است جلت آلاؤه و عمت نعماؤه و
درود نامعدود رسولی را که بحادی رسالت و رنیه نبوت طبیب عیوب
امت و شفاء صدور ملت صلی الله علیه و علی آله و اصحابه اجمعین الی یوم
الدین و بعد چنین میگوید بنده ضعیف و کمینه نحیف المستقی بسقاء النافع
المجیب یوسفی بن محمد بن یوسف الطبیب سر الله تعالی عیوبه و غفر ذنوبه که
چون بتوفیق حضرت فیاض رساله علاج الامراض که علاج هر مرض و دوای
هر عرض دردی منظور و مذکور است صورت اتمام و سمت انتظام یافت
و بشرف مطالعه بعضی از فضلای نامدار که ایشان را باین ضعیف بسیار
التفاتی میبود مشرف گردید اشارت فرمودند که کتابی در شرح
مشکلات و طریق ترتیب مرکبات که در این رساله مبین و معین شده
بار و اید فراید و فراید فواید از علامات امراض و امارات اعراض
و غیره باید نوشت تا از مطالعه آن کافه انام از خواص و عوام مستفید
و بهره مند گردند لاجرم عنان قلم بصوب این مرقوم که بجامع الفواید موسوم
است مصروف گشت

Facsimile of preface to *'Ilaj al-Amrad*

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types of diseases of various parts of human body, first describing the disease and its signs as well as symptoms in prose, and then giving the treatment in the poetic form of quatrain. Thereafter, he has mentioned certain details about the treatments and preparations of compounds under the sub-heading 'Sifat' (description). For example, he has described *Suda'-i Damvi* (headache caused by excess of blood in the body) first as 'headache caused by blood' and then given its symptoms as 'redness of eyes and face, and sweetening of mouth'. After this description, he has written the following treatment in the form of a quatrain: 'For the headache caused by blood, you are advised to undertake phlebotomy on the veins of head if you can, prepare syrup from rose-water, sugar and lemon juice, and a dish of lentil and chicking vetch be your food'.

The manuscript copies are extant in Bodleian Library, and in India in Khuda Bakhsh Oriental Public Library, Maulana Azad Library, Riza Library, and in the libraries of Nizamia Tibbiya College (Hyderabad), Salar Jung Museum, Asiatic Society of Bengal, as well as in the Central Library of Jamia Hamdard (New Delhi).

Qasidah dar Hifz-i Sihhat: Written in 1530 and presented to Babur when he was bed-ridden, this book is in the nature of a small poem (panegyric) in which the author has described the principles of hygiene in every day life in the form of sayings. He has also used Hindi terms. Its manuscripts are available in the Khuda Bakhsh Oriental Public Library, Riza Library and Maulana Azad Library.

Risalah Makul wa Mashrub: It is a small collection of poems composed in 1500, in which the author has versified different kinds of food and drinks in the form of Mathnawi. Its manuscripts are extant in Riza Library, Maulana Azad Library, and Salar Jung Museum.

Riyad al-Adwiyah : This treatise, written in 1540 and dedicated to Emperor Humayun, contains a description of simple and compound drugs and medicines arranged in alphabetical order. The manuscripts of this treatise are preserved in Khuda Bakhsh Oriental Public Library, Asiatic Society of Bengal, Maulana Azad Library, Salar Jung Museum, and British Museum.

Sittah-i Daruriyah : This treatise written in prose and containing six essential maxims on hygiene, was completed in 1538 and also dedicated to Emperor Humayun. Its manuscripts are extant in Asiatic Society of Bengal, Maulana Azad Library, Riza Library, A.P. Government Manuscripts Library and Research Institute (Hyderabad), and Salar Jung Museum.

Amrad-i Chashm: A short treatise on eye diseases and their treatment, it is only a part of a larger work, written in the 17th century, one manuscript of this is extant in Bodleian Library.

Most of the above-mentioned treatises have been published separately and also in a single volume under the title, *Tibb-i Yusufi*, several times in India.

Hakim Mir Abul Baqa, Hakim Khwaja Nizamuddin 'Khalifah, Hakim Mohammad b. Ashraf al-Husayni and Hakim Mohammad Beg were also reputed physicians of this period. The physician last mentioned was more learned and *Dastur al-Fasd* and *Khawas al-Ashiya'* are his important works.[54]

It may be noted that during the reign of Humayun (1530-1556) the progress of Unani medicine practically came to a standstill due to successive wars.

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Akbar's Reign (1556-1606)

Unani medicine registered an all-round progress during the reign of Emperor Akbar. Many skilful physicians came to India specially from Iran during his reign and contributed a great deal to the development of Unani medicine, both by their medical texts and practical experience in the treatment of diseases.

The well-known Hakims attached to the court of Akbar were: Hakim al-Mulk Shamsuddin Gilani, Abul Fath Gilani, Shah Fathullah Shirazi, 'Ain al-Mulk Shirazi, Hamman Gilani, 'Ali Gilani, Jalaluddin Muzaffar Ardastani, Muzaffar b. Muhammad al-Hussayni al-Shifa', Fathullah Gilani, Muhammad Amin Gilani, Dawa'i Gilani, Muhammad Baqar Tabrizi, Jibra'il, Ruhullah, Sheikh Hasan Panipati, Hakim Misri, Hakim Bina Lahori, and others.

The contribution of the above-mentioned physicians to the developement of Unani medicine, particularly to the growth of Unani literature, is indeed praiseworthy. A few important medical books, written during Akbar's reign, are given below:

Tibb-i Abul Fath and Qanunchah: The author of these two treatises was Hakim Abul Fath Gilani (d.1589) who was also Akbar's favourite noble. The first treatise is a collection of his tested prescriptions. The manuscript is extant in the Punjab University Library (Pakistan). The second one is a detailed commentary on Chaghmani's *Qanunchah*, which reveals the Hakim's intellectual calibre and expertise in Unani medicine. But both the treatises are still unpublished.

Sharah-i Qanun and Bayad-i Gilani: Believed to be a disciple of Hakim Abul Fath Gilani, Hakim 'Ali Gilani (d.1609) is the author of these two works. He had full command over Unani medicine, both theoretically and practically, and hence he was held in high esteem by Akbar and his nobles. The first treatise is a commentary (in four volumes in Arabic language) on *Al-Qanun fi'l Tib* of Ibn Sina (d.1037). It is the second complete commentary on *Al-Qanun*, the first one having been written by 'Allamah 'Allauddin Ibn Nafis Qarshi (d.687 A.H.). The second treatise is the collection of his tested prescriptions. Both works have not been published yet.

Diya' al-'Ayn: The author of this work on ophthalmology (as the title indicates) is Hakim 'Ayn al-Mulk Shirazi (Dawa'i). All historians of Akbar's period are in agreement that he was an expert on this subject. He wrote another treatise on simple drugs (*'Ilm al-Adwiyah*) in poetic form titled, *Fawa'id al -Insan*, in compliance with Akbar's order. Both the treatises are also still unpublished.

Shifa' al-'Alil (*Qarabadin-i Shifa'i*): This is a pharmacopoeia compiled by Hakim Muzaffar b. Muhammad al-Hussayni al-Shifa'i, a popular poet and experienced physician. He was asked to treat the mother of Emperor Akbar, when she was on her death bed. It has been published and also translated into Urdu language.

Khulasat al-Tibb: The author of this work is Hakim 'Abdullah Dawa'i (see facsimile of preface on p. 345). It comprises 700 pages and was compiled in 1591. It is still unpublished and probably, therefore, unknown to the historians of Unani medicine. Seemingly, it is not even mentioned in any published catalogue of the world. However, one copy of this precious manuscript in good condition is available in the Central Library of Jamia Hamdard.[55]

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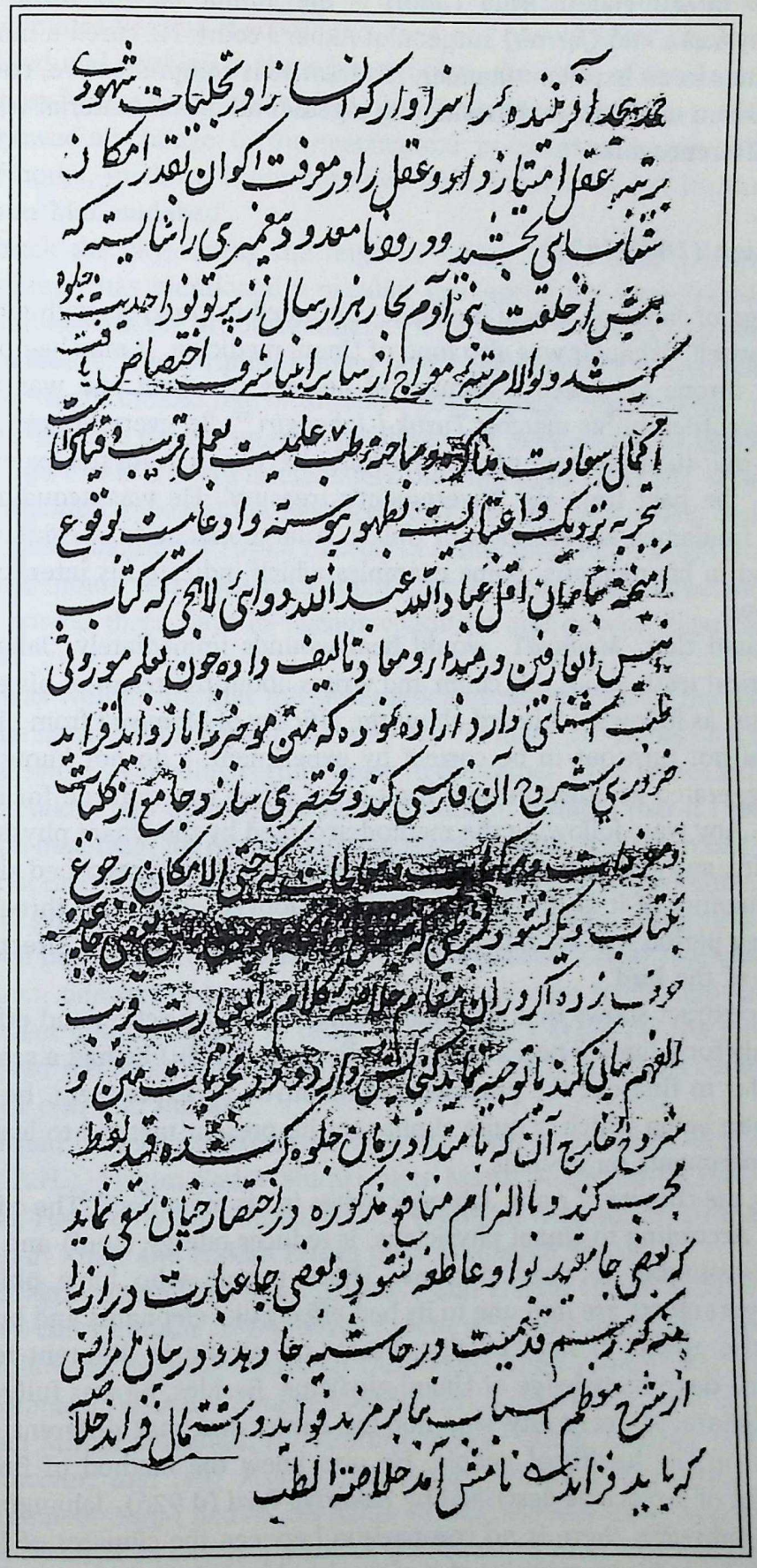

Facsimile of preface to *Khulasat at-Tibb*

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Khulasah-i Bina'i: Hakim Bina Lahori is the author of this work who was an experienced physician and *(jarrah)* surgeon of Akbar's court. He cured a number of cases of serious wounds in an excellent manner. His treatise is comprehensive, covering almost all aspects of Unani medicine and assembling together all useful material which he found scattered in different works.[56]

Jahangir's Reign (1606-1627)

During the reign of Jahangir, Unani medicine continued its progress with more successes. A naturalist himself, Jahangir was also fond of Unani medicine. It may be noted that after ascending the throne he issued a number of decrees of which one was about Unani. Jahangir has recorded in his memoir *Tuzuk-i-Jahangiri*[57]: 'In every big city, hospitals be established so that the treatment of patients could be ensured. All the expenses incurred in this regard be paid from the government's treasury'. He was acquainted with the doctrines and fundamental principles of tibb to a large extent as is evident from many instances found in his memoirs. Some examples which indicate his interest in medicine are given below:

It was stated that *Momiya'i* would heal wounds immediately. Jahangir tried to know the practical truth about this claim and writes about the result of his experiment in *Tuzuk-i Jahangiri* as follows:[58] 'I heard about the efficacy of *Momiya'i* from physicians, but their words did not turn out to be correct by experiment. I do not know whether the physicians exaggerated its effect beyond limit or its effect was reduced for its being kept for a long time. Any way, following the method accepted by the Unani physicians, I broke the leg of a bird and fed it a quantity of *Momiya'i* over the prescribed dose and also rubbed some quantity of it on the broken area and looked after it for three days though the given healing period was from morning to evening. But no healing effect appeared on the broken leg of the bird' .

The above extract shows that (i) Jahangir knew that the action and effect of simple drugs lasted only for a limited period and then disappeared; (ii) he had a searching mind; and (iii) in order to find out the properties of *Momiya'i* by experiment, he chose a bird instead of human being which is quite similar to the present method to learn the action of drugs by experiments on animals.

Describing the climate of Agra, Jahangir writes in his memoirs:[59] 'The climate of Agra is hot and dry. According to Unani physicians, it reduces energy (soul) and brings about fatigue. It is unsuitable to most persons. Those people who have phlegmatic and atrobilious temperaments are immune to its bad effects like elephants and buffaloes'. This description of the effects of hot and dry climate on people of different temperaments reveals Jahangir's deep knowledge of Unani medicine. Besides, he was fully aware of the fact that the climate of every city was not the same, and that different climates had different effects on the health of people. He also knew the method of finding out the climatic condition of a place as described by Zakariya Razi (d.926). Jahangir states in his Memoirs:[60] 'Undoubtedly, there is no comparison between the climates of Mahmudabad and Ahmedabad. In order to examine this view, I ordered that a skinned sheep be hung

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on the bank of Kakarya lake and a similar sheep be hung in Mahmudabad so that the difference (in climate) became clear. It was done at 7 o'clock after day-break. It became so much putrefied and stinking in three hours before the close of the day that it became impossible to pass by it. On the other hand, the sheep that was hung in Mahmudabad in the morning showed no change by the evening and putrefaction began in the night after one-and-a-half hours. In short, it got putrefied after 8 hours (*Sa'at*) in Ahmedabad and after 14 hours in Mahmudabad'.

Plague struck the city during the reign of Jahangir and took a large toll. In this connection, Jahangir has mentioned a peculiar incident in his memoirs which confirms that he was familiar with the art of treatment. He writes:[61] 'One day a rat was seen in the courtyard of the house. It was running about and falling like intoxicated persons and did not know where to go. I asked one of the slave-girls to pick it up from the tail and throw it in front of the cat. The cat got up from its place with interest and enthusiasm, and took it in its mouth and threw it down immediately showing signs of hatred. Gradually, marks of gloom and vexation appeared on her face. Next day, she was nearly dead. It came to my mind that some quantity of *Tiryaq-i Faruq* (a compound Unani drug) should be given to her. When her mouth was opened to administer the drug, her tongue and palate were all black. She passed three days in serious condition and gained consciousness on the fourth day'.

Jahangir was well aware that the sweetness and tastefulness of the milk of animals depended on the nature of food given to them. For example, the camel's milk is saltish but it can be turned sweet by feeding certain items to the camel, as he writes in his memoirs.[62] 'The son of the Hakim was praising the milk of camel. I thought that if I took it for some time, it might be beneficial for me and suit my temperament. Asif Khan had a foreign she-camel. I drank some of its milk. I found it sweet and delicious unlike the milk of other camels which is saltish. I took one cup, to half a bowl of water, of its milk daily for one month. It proved beneficial. It quenches thirst. He feeds the camel four *seer* of cow milk, five *seer* of wheat, one *seer* of brown sugar, one *seer* of anise seeds daily so that its milk be delicious, sweet and beneficial. In order to examine, I asked for the milk of cow and buffalo and tasted the three kinds of milk and found the milk of this camel more sweet than the milk of cow and buffalo'.

The renowned physicians associated with the court of Jahangir were Hakim Rukna Kashi (d.1066 A.H.), Hakim Sadra Shirazi alias Masih al-Zaman (d.1061 A.H.),Hakim Momina Shirazi, Hakim Momin Shirazi, Hakim Ruhullah Gujrathi, Hakim 'Abd al-Shakur, Hakim Amanullah Khan and Hakim Hasan alias Muqarrab Khan.

Of them, Hakim Amanullah Khan (d.1657) and Hakim Hasan (d.1646) were noted for their literary contributions to the development of Unani medicine. The former is an author of the following medical works: *(i) Qarabadin 'Khan Zamani or Ganji Bad Award; (ii) Dastur al-Hunud (Tarjumah Madan Vinod);* (iii) Umm al-'Ilaj; (iv) Miftah al-Hudud Ma'Muqaddimah Miftah al-Hudud; *(v) 'Ashrahi Kamilah Khan Zamani; (vi) Muqaddamah Bur Mirat al-Jawahir; and (vii) Risalah Dur Tariq-i Mushilat. Ganj-iBad Award* is also known by the name of *Ganj-i Bad Award Sahib Qirani*, as mentioned in the preface to this book. It may be taken as an encyclopaedia of *Qarabadin* (Unani pharmacopoeia) in which

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Hakim Amanullah has collected all the medical works of old and new physicians up to the Mughal period. In addition, the author has taken great pains in searching and putting together a number of prescriptions of compound drugs for every disease. Its importance can be judged by the fact that the author has consulted more that 105 Arabic and Persian books, including a few Sanskrit books for his compilation. In other words, it is a good collection of Unani and Ayurvedic pharmacopoeia. In view of its importance, a brief account of its contents are given below:

The author had divided the books into three parts and named them as *Miftah, Ganjur* and *Telism.* The first has 16 chapters titled *Fath as* follows:

(i) Definition of food, drug and poison; (ii) Collection and storage of drug; (iii) Temperament of drugs and their degrees; (iv) Selected parts usable in simple drugs; (v) Method to recognise whether the drug is pure and unadulterated; and (vi) Description of medicines and inorganic compounds comprising nine *San'at* (sections): Management of drugs; arrangement of drugs; making of calx; washing (cleaning) of precious stones; burning (oxidation) and roasting of drugs, extraction of substances, grinding (to make powder) and rubbing of drugs; melting or dissolving of substances; purging and cleaning of drugs; (vii) Composition and use of drugs,(viii) Determination of degrees of compound drugs; (ix) Weights and measures; (x) Quantity of medicine (dose); (xi) Corrective and substitute medicine;(xii) Life of drugs; (xiii) Literal research on simple drugs; (xiv) Explanations for names of some compound drugs; and (xv) Description of narcotic and intoxicating simple drugs.

The first *Ganjur* (Book I) describes those simple and compound drugs that are related to certain particular diseases. It is divided into eight *Naqd* (sections):

(i) Account of some simple and compound drugs with regard to diseases;

(ii) Description of those compound drugs that are meant for specific use in certain diseases and these are described in nine 'aqd (sub-sections) as follows: (a) drugs for eye diseases, e.g, suppository; collyrium or antimony; powdered drug for sprinkling; (b) for nasal diseases, like snuffs; medicines blown into nostrils, inhalers; cephalic medicines etc; (c) for oral diseases; (d) dentifrice drugs; (e) for gargle; (f) for odour of arm-pit; (g) for ear drop; for piles; and (h) fistula; (iii) for expulsion which are also in 9 'aqd (sub-sections): (a) coctive, (b) decoctive (c) purgative, (d) emetic, (e) diuretic, (f) mucic, (g) suppository, (h) enema and (i) wormifuge; (iv) Drugs for suppression: it has four 'aqd (sub sections): (a) antiemetic, (b) antipurgative, (c) antipurspitative, (d) antidiuretic; (v) for beautification (adornment) of body; for hair-dye, fattening and thinning of body, for opening of voice. It is in nine *aqd* (sub-sections); (vi) Aphrodisiac drugs; it has six aqd; (sub-sections); (vii) Drugs meant for women: it is in twelve 'aqd (a) for pregnancy, (b) drugs which help in diagnosing barrenness of women and also information of male and female child, (c) drugs for abortion and expulsion of dead baby, (d) drugs to be administered at the time of childbirth to facilitate delivery, (e) anti-pregnancy drugs, (f) drugs for seminal effusion, (g) emmenagogue, (h) drug releasing menses, (i) suppression of menses, (j) for making breasts small and shapely, (k) for increasing milk of mother, (l) drugs for decreasing sexual desire;(viii) treatment of persons stung or bitten by poisonous creatures like snake and scorpion as well as antidotes, treatment of

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injuries inflicted by arrows, swords, gun shots, and devices to put the noxious animals to flight.

Second *Ganjur* (Book II) deals with antidotes, compounds of opium, electuaries (*m'ajin*), exhilarants (*mufarrahat*), pills, linctuses, tablets, powders, syrups, oxymels, oils, extracts and other compounds. Its has eight 'aqd:

(i) electuaries which include antidotes, compounds of opium, digestive compound drugs (Jawarishat), myrobolans,(Itrifalat, exhilarants (Mufarrahat) linctuses, powders, anti-toxins, chinaroot, tea, coffee and tobacco; (ii) Indian drugs; it has four 'aqd: (a) Characteristics and actions of certain Indian drugs; (b) Compound drugs used by Indian physicians; (c) poisons and their antidote; (d) compounds called rasa or *rasayana*; (iii) Calx of mercury and its use, as well as the mercurial drugs; (iv) Different kinds of syrups, oxymel, rose conserve (*gulqand*), jams; (v) Extracts (*a'raqiyat*), which include medicines and exhilarants, different kinds of wines, extract of roots, extract of fruits, whey, meat extract, vinegar, mead, drugs soaked into water (*Khesandah*), date extracts (drinks made from dates or raisius), acids, milk etc; (vi) Liniments, poultices, ointments, Qayruti (a kind of ointment), sprinkling powders; (vii) Oils; and (viii) Vapour bath, fomentation, douche, incenses, immersion bath, foot-bath and unguents.

The third *Ganjur* (Book III) contains descriptions of perfumes, foods (for sick as well as healthy persons), different kinds of sweets, pickles, salts and alkalis, preparation of odorous and anaesthetic medicines, etc.

The third part i.e. *Telism* deals with different chemical operations and metal devices under eighteen heads.

Dastur al-Hunud: This work is, in fact, a translation of Sanskrit text, the *Madana Vinoda,*[63] rendered in 1635 by Hakim Amanullah Khan, who has also given an important reason in the preface for translating this book as follows: 'Don't you see that God (the Real Healer) had produced drugs in various countries to suit the temperament of their people and their diseases and afflictions. Therefore, it is not possible to correct the temperaments of the people of a country and maintain their health without the knowledge of properties and action of the drugs produced in that land as well as their language and terms. On the basis of this wise principle, I got fully absorbed in learning the language and terminology of Indian physicians and studying and selection of their works. I found *Madana Vinoda*, the product of the fertile brain of Raja Madan Pal, as the finest and the most comprehensive of all the books, and translated it and gave it the title *Dastur al-Hunud*'.

This treatise consists of preface, three chapters and a colophon. The preface briefly deals with the terms, principles and theories of Ayurveda; it also describes the Ayurvedic theory of *tridosa* (vata, pitta and kapha) *vis-a-vis* diseases. It corresponds to the Unani theory of *Akhlat* (humours). In this respect, it emphasizes an important point that diseases are caused as a result of the derangement of the humours (*tridosas)* and that the derangement is sometimes caused by foreign agents, and sometimes by internal causes. In both the cases, the putrefied matter should be exterminated instead of expelling the humour.

The first chapter of this treatise deals with the properties and actions of simple drugs. The second describes foods and drinks. In all, 700 Indian simple drugs, foods and

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drinks have been described in these two chapters. The third chapter contains Ayurvedic pharmacopoeia. The manuscripts of this work are extant in Khuda Bakhsh Oriental Public Library, Asifiya, Muslim University, and Jamia Hamdard.

Umm al-'Ilaj: This text is on the principles and rules governing the coctives of humours and purgation i.e. those to be considered carefully in the context of age and temperament of the patient, quantity of medicine (dose), season, and other relevant matters before administering simple purgative drugs. Written in 1627 and dedicated to Emperor Jahangir, the manuscripts of this treatise are available in the libraries of the Asiatic Society of Bengal and the British Museum. It was published in 1872, but this publication contains only simple purgative drugs.

Miftah al-Hudud: It is dedicated to Mahabat Khan and its manuscripts are available in Khuda Bakhsh Oriental Public Library and National Museum, New Delhi.[64]

Besides these medical tracts, *'Ashrah-i Kamla Khan Zamani, Risalah Dar Tariq-i Mushalat* and *Muqddimah Bar Mir'at al Jawahir* [65] are also accredited to Hakim Amanullah Khan.

Hakim Hasan (Muqarrab Khan) was a noted surgeon of his time. He used to perform venesection (*Fasd*) on Jahangir. He compiled a number of medical treatises, but only one is extant today, i.e *Anis al-Kahhal*, which is on ophthalmology, as its name indicates.

Shahjahan's Reign (1627-1658)

During the reign of Emperor Shah Jahan, Unani medicine made further strides. Hakim Khushhal (d.1050 A.H.), Tabibah Sati *al* Nisa, (sister of Talib Amli, the famous court poet of Shahjahan. She died in 1056 A.H.), Hakim Nizamuddin Ahmad Gilani (d.1059 A.H.) Hakim Mir Mohammad Hashim (d.1066 A.H.), Hakim Hadhiq (d.1067 A.H.), Hakim Dawud Taqarrub Khan (d.1073 A.H.), Hakim Fathullah Shirazi (d.1653 A.H)., Hakim Ziauddin Rahmat Khan, d.1050 A.H.), Hakim Nuruddin Mohammad 'Abdullah 'Ain al-Mulk Shirazi (d.between 1055-1057 A.H), Hakim Saleh Shirazi (d.1084 A.H.), Hakim Ma'sum Khan (d.1050 A.H.), Hakim 'ali Afzal Qazwini and Hakim Asif al-Zaman were the court physicians of Shahjahan.

The nature and dimension of the development of Unani medicine in this period is reflected in a telling manner by the works of two very distinguished physicians, namely, Hakim Nizamuddin Ahmad Gilani and Hakim Nuruddin Muhammad 'Abdullah. The former is the author of the following six works (which were compiled by the Hakim during his stay in the Deccan as a court physician of Sultan'Abdullah Qutb Shah) (1625-1672) : (i) *Majmu'ah-i Hakim al-Mulk*; (ii) *Shajrah-i Danish*; (iii) *Khawas al-Adwiyah*; (iv) *Khulasat al-Tadhkirah fi'I Tibb al-Tajrabah*; (v) *Asrar-al Atibba*; and (vi) *Istilahat al Atibba'*

Majmu 'ah-i Hakim[66] *al Mulk* is a collection encompassing as many as 42 subjects, although according to the author, it has 99 subjects, mostly on medicine; but other topics like theology, philosophy, the creation of universe (cosmology), geography, rhetoric, magic, supernaturalism, biology and alchemy have also been discussed. He has given some bibliographical notes as well. The important subjects dealt with in this collection

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are: (i) Clinical qualities of certain simple and compound drugs, like coffee, tobacco, China-wood, camel's milk, etc; the first simple drug described in this treatise is myrobolan (*halilah*); (ii) Honey-bee, silk-worm, fly and other insects; (iii) Human semen, its nature, functions and actions, reproduction and the like; (iv) Temperament: hot, cold, moist and dry; (v) Soul and its form (psyche); (vi) Deleterious effects of excessive sexual intercourse; (vii) Longevity of animals and insects; (viii) Physiognomy as well as alchemy; (ix) Some tested treatments; (x) Hygiene; (xi) Fire, water, steam, smoke, lightning and thunder, spring, earthquake, genesis of mercury and some other minerals and stones; (xii) Some special simple drugs; (xiii) Medical treatise of Razi:Bar'al-Sa'ah (in Arabic); (xiv) Thebaic electuray (*Tiryaq-i Faruq*); (xv) Poisons; (xvi) Bezoar-stone; (xvii) Some special antidotes like opium, etc; (xviii) Four elements; and (ix) Prescriptions of physicians.

His second work *Shajrah-i Danish,*[67] is also a collection of treatises and articles on rational sciences and medicine, but a major portion of this work is devoted to medicine as under the following heads follows: (i) A short tract comprising Hippocratic prescriptions and also additions by the author himself; (ii) A treatise dealing with poisonous creatures and antidotes of their poisons; (iii) A treatise dealing with qualities of some poisons and their use; (iv) A tract on biographies of Abu Nasr Farabi and some other philosophers; (v) A treatise on some peculiar creatures like honey-bee, silk-worm etc; (vi) Some supernatural acts; for example, curing fever through genie or fairies; (vii) A treatise on the peculiarities of magic, talisman, charms and hymns, as well as qualities of some simple and compound drugs; (viii) Treatise on properties of lemon, groundnut and certain compound drugs; (ix) Tract of Ibn Sina named Firoziya containing also the list of contents of his encyclopedic work al-Qanun il Tibb; (x) A treatise on *Tibb,* its objects and possibilities written for students of medicine; (xi) A tract written on medical prescriptions; (xii) A tract on the method of adjusting the temperament of drugs; (xiii) A treatise on life maintaining drugs; (xiv) A tract concerning different temperaments of drugs like real temperament, medical temperament, immoderate temperament and their meaning; (xv) A tract on physiognomy;(xvi) A treatise on tea, coffee, and China-wood containing prescriptions or instructions of Hakim 'Ali, as well as description of compound drugs used by Hakim Muhammad Baqir Damad; (xvii) A lexicon of *Tibbi* (medical) terms; (xviii) A list of medical works written in Persian; and (x) A tract on the causes of death. It may be noted from the above list of contents that *Shajrah-i Danish* contains some treatises which are also included in his other collection, *Majmu'ah-i Hakim al-Mulk.*

The third text, *Khawas al-Adviyah,* describes the characteristics and actions of simple drugs. One manuscript copy is extant in the Mashriqi Kutub Khana of Salar Jung Museum. Manuscript copies of *Khulasat al-Tadhkriah fi'l Tibb al-Tajribah, Asrar al-Atibba* (scribed in 1690) and (scribed in 1698) are available in Khuda Bakhsh Oriental Library, and Assafiya Library, respectively. The fourth one, *Sifat wa Khawas-i Momiya'i,* is a tract related to the qualities and effects of *Momiya'i* (a medicine used as panacea), as is evident from its name. A manuscript copy of this work (scribed in 1690) is also extant in Aasifiya Library.

Though some other works of Hakim Nizamuddin Ahmad, are available, they have got scattered in various libraries; for example; *Risalah dar sharh-i Pad Zahr* (3 folios, scribed in 1053 A.H) is in Riza Library, while *Bahiya* (containing some drugs on sex,

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scribed in 1045 A.H.), *Ahwal-i 'Anasir* (3 folios, scribed in 1045 A.H.) and *Risalah Chub Chini,Qahwah, Cha'i wa Tambaku* (scribed in 1045 A.H.) are in Aasifiya Library.

Hakim Nuruddin Muhammad 'Abdullah (d.1648), another noted physician during Shahjahan's reign, wrote the following books:

Anis al-Mu'alijin : This is an, important medical work and has been reprinted several times. *Jama' al- Atibba*, also known by the name of *Alfaz al-adwiyah,* is a Unani pharmacopoeia and describes simple as well as compound drugs in alphabetical order. Its importance lies in that it also contains certain drugs which are not found in other general books dealing with simple drugs. The author has also given the exact pronunciation of each drug with their names in Persian, Arabic and Hindustani, and thus enhancing the usefulness of this book written in 1628-29 and dedicated to Emperor Shahjahan. The manuscript copies of this work are in Bankipur Library, Asiatic Society of Bengal, Nizamia Tibbia College, Central State Library (Madras), Mashriqi Kutub Khana Salar Jung Museum, and Jamia Hamdard, and they have been published several times from different places.[68]

Another work of this Hakim 'Abdullah is *Tibb-i Dara Shikohi,* known also as *'Ilaj-i Dara Shikohi* (written in 1645), and dedicated to Dara Shikoh. The book contains sayings and tested prescriptions of Greek as well as Arab physicians like Hippocrates, Galen, Razi, Ibn Sina, Najibuddin Samarqandi, Hakim 'Imaduddin Mahmud Shirazi, and others. Besides, it includes ideas and experiences of Indian physicians, breathing exercises which the Ayurvedic physicians used to prescribe for the treatment of various diseases. In fact, this book is a unique collection of the practices and experiences of Greek, Arab and Indian physicians.

Tibb-i Dara Shikohi has two parts. The first part describes hygiene, and the second part is in two sections, the first of which deals with anatomy and phlebotomy, and the second describes diseases of all parts of the body from head to foot, with their treatments.[69] The chapter on syphillis is rather long, while the one on surgery is quite short. The author has also suggested the treatment of cataract by drugs. The manuscript copies of this book are available in Khuda Bakhsh Oriental Public Library, Asiatic Society of Bengal, Central State Library and Nizamia Tibbia College. One manuscript is also available in Paris.

In addition to the physicians described already, Hakim Ahmad b. Muhammad Multani, Afzal Qazwini (author of *Mujarrabat al-Shifa'*(1636) and *Manafa'-i Afzaliyah*, (1641), Hakim 'Abdullah Khan (author of *Fars Namah*) and Hakim Asifuzzaman (author of *Qarabadin-i Asifi*) (1640) were the prominent physicians of this period.

Aurangzeb's Reign (1658-1707)

During the reign of Aurangzeb, the progress of Unani medicine continued unabated. Not only were the important medical works translated into Persian, but several medical books of high standard were also written. Besides the impressive output of medical literature, a large number of hospitals were established in the capital and other cities in the kingdom of Aurangzeb. Many nobles and wealthy persons took part in this act of welfare. For example, Khayr Nawab Andish Khan Kanboh established a big hospital in Etawah, where he appointed both Unani and Ayurvedic physicians. Free treatment was given there to the

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poor and the needy. Khayr Andish Khan was well-versed in tibb and compiled a book entitled *Khayr al-Tajarib* on medicine (1689). In the preface of his book, he has referred to this hospital in these words: 'Therefore, this man of little ability named Muhammad Khan alias Khayr Andish Khan built a hospital in the town of Etawah to get reward in the life hereafter, and appointed a number of physicians like Hakim 'Abdurrazzaq Nishapuri, 'Abdulmajid Isfahani, Mirza Muhammad 'Ali Bukhari, Hakim Muhammad 'Adil, Hakim Muhammad A'zam (Unani physicians), and Kanwal Nayn, Sukh Anand, Nayn Sukh (vaids), who are his old friends. They are directed to provide costly as well inexpensive medicine of all kinds and food for the needy and the poor and also necessary items of treatment and nursing in an appropriate volume in the hospital. By the grace of God, the hospital is functioning as desired.'[70]

The famous Unani physicians of this period included the following Hakims: Muhammad Amin Shirazi, Mir Mehdi Ardastani, 'Abdurrazzaq Mashrab, Na'mat Khan 'Ali, 'Abdurrazzaq Isfahani, Sheikh Husain Shirazi, Muhammad Hashim alias 'Alvi Khan, Mohsin Khan, Al-Mulk Hadhiq Khan, Muhammad Akbar Arzani, Darvesh Muhammed Aymanabadi, Muhammad Husain Khan Shirazi, Abul Qasim Astarabadi and Dawood Isfahani.

The multi-level development of Unani during this period owes a great deal to the services of Hakim 'Alwi Khan (d.1749) and Hakim Arzani's (d.1722) . The former was born in Shiraz in 1669 and, after completing his education there, he came to India in 1700 and received the honour of audience in the court of Emperor 'Alamgir (Aurangzeb), who bestowed on him the robe of honour and gifts and deputed him to the service of his son Mohammad A'zam. The Hakim remained in his service for a long time and later entered the service of Prince Muhammad Mo'azzam (Bahadur Shah) when his patron was killed in the war of succession. It was this monarch who bestowed on the Hakim the title of 'Alwi Khan. Befitting this title, he was one of the few Unani physicians during the Mughal period who gave a fillip to *tibb* with great skill and excellence. After his death, and even to this day, 'Alwi Khan is looked upon as a respectable and acknowledged master in the tibbi circle of the Indian sub-continent. His books bear ample testimony to his wide knowledge, practical insight and understanding. According to Nuzhat al-Khawatir, he was one of the rare personalities of the time.[71] His teaching circle was very wide and pupils and physicians having thirst for knowledge used to benefit from his vast knowledge.

Hakim ' Alavi Khan wrote the following books: (i) *Hashiyah - Sharah-i Asbab wa 'Alamat*; (ii) *Sharah-i Mujaz al-Qanun*; (iii) *Jama'al-Jawama' Muhammad Shahi*; (iv) *Ahwal-i Aa'da' al-Nafas*; (v) *Matab-i Hakim 'Alavi Khan*; (vi) *Risalah-i Qawanin-i Ilaj;*(vii) *Risalah-i Amraz al- Atfal*; (viii) *Ilxaj al-Humma*; (ix) *Ilaj al-Insan*;(x) *Hashiyah-i Sharah-i Hidayat al-Hikmat, Mibadhi*; (xi) *Sharah-i Tahrir-i Uqlidas*; (xii) *Risalah fi al-Mosiqi*; (xiii) *Sharah al-Majisti*; (xiv) *Tadhkirat al-'Ilaj*; (xv) *Aathar-i Baqiyah*; and (xvi) *Risalah-i Dastur-i 'Ilaj-i Su al-Qinyah wa Istisqa'*.

Hasthiyah-i Sharah-i Asbab wa 'Alamat is an annotation on the famous commentary of *'Allamah Naifs* b. 'Aiwaz Kirmani, known as Sharah al-Asbab wa al-'Alamat. Likewise, *Sharh-i Mujaz al Qanun* is a commentary on the abridgement of the world-famous encyclopaedic medical work of Ibn Sina, *Al-Qanun,* which was abridged by 'Allamah

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'Alauddin Qarshi under the title of *Mujaz al-Qanun*. Jama' al-Jawama' Muhammad Shahi (Qarabadin-i 'Alar Khan) dedicated to Muhammad Shah (1718 to 1748), is an important work of the Hakim, six volumes of which have been located so far (four volumes are extant in Raza Library and two in the Central Library of Jamia Hamdard). These six volumes comprise about 2000 pages, and have 3 discourses and the *Khatimah* (conclusion). Another work, *Ahwal-i Aa 'za' al-Nafas*, deals with chest diseases. It contains 1194 pages having one preface and three discourses. The manuscript is available in the Central Library of Jamia Hamdard, scribed in the end of the nineteenth century. It is in very good condition. *Matab-i Hakim 'Alavi Khan* is a collection of tested prescriptions of the Hakim. One complete manuscript copy (855 pages) is available in the Central Library of Jamia Hamdard. Yet another small text, *Risalah-i Qawanin-i Ilaj*[72] (89 pages and written in 1151 A.H), describes the diagnosis of diseases and research on drugs and foods, as stated in the preface (see facsimile on p. 355). The manuscript, which is in good condition, is available in Khuda Bakhsh oriental Public library, Riza Library and, Central Library of Jamia Hamdard but scribed at the end of the nineteenth century. The last one has been published.[73]

A book on child diseases, *Risalah-i Amraz-i Atfal*, is included in *Matab-i Hakim 'Alavi Khan. Tadhkiratal-'Ilaj* is also an important work of Hakim Alavi Khan running into 668 pages. It is in two volumes dealing with the diseases of the head. This manuscript is extant in the Library of Daral-ulum, Deoband (U.P).

'Haj al-Humma, Dastur-i 'Ilaj-i Su' al-Qinyah wa Istisqa' and 'Ilaj al-Insan are short treatises available in Riza Library and Nadwat al-'Ulama' (Lucknow), respectively. Some scholars have taken *Dastur al-'Ilaj* as a separate work of the Hakim, which is not correct; it is just the short name of *Dastur-i 'Ilaj-i Su' al-Qinyah wa Istisqa'* . It may be pointed out that some books having the name of 'Alavi Khan' or 'Alavi' in the end, like *Mufradat-i 'Alavi, Bayaz-i 'Alavi, Mujarrabat-i 'Alavi Khan, Qawai'd-i 'Alavi Khan, Dasturat-i 'Ilaj-i 'Alavi Khan,* have also been included among the works of the Hakim by some scholars. In fact, these are not his works, but important parts of his different books that were compiled under separate names by his pupils after his death. The manucript copies of these books are available in Tibbiya College (Aligarh) and Riza Library. Both *'Ashrah-i Kamilah and Khulasat al-Tajarib* have been also wrongly attributed to Hakim 'Alwi Khan.

Hakim Arzani, noted for his learning and skill, is the only physician of the Mughal period, who rendered the Arabic treasure of Unani medicine into Persian language and has, thus, given an opportunity to the Persian-knowing class of Unani physicians to benefit from this rich treasury. Besides the translations, he wrote several medical books: (i) *Talkhis-i Tibbi Nabawi*; (ii) *Tibb-i Akbar*; (iii) *Mufarrah al-Qulub*; (iv) *Mizan al-Tibb*; (v) *Ta'arif al-Amraz (Hudud al-Amraz)*; (vi) *Mujarrabat-i Akbari* and (vii) *Qarabadin-i Qadri*.

Talkhis-i Tibbi Nabawi is an abridgment of *Al-Manhaj al-Sawi wa al-Manhal al-Rawi fi'l Tibb al-Nabawi* of 'Allamah Jalaluddin Suyuti, which was translated into Persian by Hakim Arzani for the study of Aurangzeb. It was the foremost work of the author, as mentioned in the published edition. *Tibb-i Akbar* is the Persian translation and commentary on the famous medical book *Sharah al-Asbab wa al-'Alamat of Nafis b. 'Aiwaz*

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بسم الله الرحمن الرحیم

حمد معبود و نعت راهنما: از که آمد که من کنم انشا؛ حمد حق از زبان حق باید
نعت هم از زبان حق باید؛ منقبت خوان آل و اصحابم؛ با بزرگان براه آدابم
بهر بخشایشم ایشان راجی؛ گر نباشم بمعصیت ناجی؛ من بدان راز خویشتن به
دانم؛ خویش را کمتر از همه خوانم؛ اما بعد این رساله ایست مختصر مفید مسمی بخلاصه
قوانین علاج که یگانه زمان و وحید دوران تذکره حکمای باستان حکیم باشی
بادشاهان هند و ایران استاد و مرشد کامل نواب معتمد الملک حکیم علوی خان
خلف سید سند میرزا هادی شیرازی که بتکمیل علم ابدان بی انبازی که ماده تاریخ
انتقال و سال ارتحالش از جهان فانی بدار البقای بی کم و کاست ازین مصرع
دلنشین مبین و مستفاد ع بقراط زمانه از جهان رفت. برای تحصیل طالبان
علم شریف طبابت تالیف کرده فی الحقیقت در تشخیص امراض و اعراض
و تحقیق ادویه و اغذیه سحر سامری بل اعجاز عیسوی بکار برده و دریا را با این مد
جزر تقبید کوزه خاک در آورده نظم انرا که سری بنکته دانی است

Facsimile of preface to *Risalah-i Qawanin-i Ilaj*

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Kirmani (1701). The Hakim also made some additions to his own and dedicated it to Aurangzeb. This book has two volumes comprising 212 and 200 pages each. Both the volumes were published in 1896-97. *Mufarrah al-Qulub* (623 pages) is a commentary on *Qanunchah* of Mohammad b. Mahmud Chaghmini. Arzani began this work in 1701 and completed it during the reign of Farrukh Siyar over two decades later (published in Kanpur in 1886). *Mizan al-Tibb* comprises 200 pages and discusses several diseases, causes, treatment, and the principles of their treatment. It was also written in 1701 and published in Lucknow in 1889. *Ta'arif al-Amraz (Hudud al-Amraz)* is the only book of Hakim Arzani in Arabic language. In this book, the author has dealt with various diseases, giving explanations about medical terms, printed in Delhi in 1898. *Mujarrabat-i Akbari* is a collection (218 pages) of prescriptions of many physicians under several chapters on diseases (printed in Kanpur in 1884). *Qarabadin-i Qadri* is a Persian pharmacopoeia (500 pages) written by Hakim Arzani in 1715.[74] The author has dedicated this book to his Murshid (religious guide), the famous sufi (mystic) Shaikh 'Abdul Qadir Jilani as mentioned by him in the preface to this book (published in 1882).

Besides, he wrote two more books: *Ilaj al-Sibyan* and *Tibb-i Hindi*. Although Storey has mentioned the first,[75] the second which deals with experiences of Indian physicians with regard to medical treatment has not been recorded by any biographer, nor has it been mentioned in any book on history of drugs. A manuscript copy of the work is available in the Oritental Manuscripts Library and Research Institute, Hyderabad.

In addition to the physicians described in the foregoing pages, there were many other physicians of Aurangzeb's period as evidenced by references to them in some historical books. For example: *Maathir-i 'Alamgiri* (p.362) has mentioned the names of Hakim Muhammad Shafi and Hakim Muhammad Riza Shirazi (author of *Riyaz-i 'Alamgiri*). *Tadhkirat al-Salatin-i Chaghata* has recorded the names of Hakim Sadaqat Khan (pp.332, 349), Hakim 'Askari (p.64) and Hakim Shaikhuzzaman Khan (pp.249,281). *'Aalamgir Namah* has given the names of Hakim Ahmad 'Arab (p.892), Hakim Jamalai Kashi, formerly known as Dayanat Khan (p.54), Sheikh Ahmad Qannwji (Tuhfat al-Atibba'), Darvesh Mohammad Ayman Abadi (author of Tibb-i Aurang Shahi) and Hakim 'Abdullah Akbarabadi were also the famous physicians of Aurangzeb's reign.

Post 'Alamgir's Period (1707-1800)

It is well known that, after the death of Aurangzeb, the Mughal empire became destabilised more or less completely due to the fierce war of succession. Despite the strife and political turmoil, several physicians were active and kept the candle of Unani medicine burning. Though a majority of those physicians were of Indian origin, they appeared to be direct or indirect pupils of one or the other Iranian physician. Some of the important Indian and Iranian physicians of the post-'Alamgir period (1707-1800) deserve our attention:

(i) Hakim 'Alavi Khan Shirazi (mentioned in the 'Alamgir period); (ii) Ahmad al-Tabib al-Birjandi, known as Jalaluddin (flourished during the reign of Muhammad Shah) and wrote *Shifa' al-Qulub*, which was dedicated to nawab Amir Khan, who was the

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Governor of Allahabad; (iii) Hakim Shaikh Kalimullah Jahanabadi (also flourished during the reign of Muhammad Shah) and compiled a commentary on *al-Qanun* in 1728; (iv) Hakim Ibn Ramazan Baig Mazandarani (flourished during the days of Muhammad Shah) and wrote a book on reproduction called *Asbab al-Nishat* and dedicated it to Emperor Muhammad Shah; (v) Hadhiq al-Mulk Hakim Muhammad Kazim lived during the reign of Muhammad Shah; also the author of *Akmal al- Sana'at* written in Arabic in 1736 which is popular among the Unani physicians even today; he is also the author of Jami' al-Sana'at, died in 1736; (vi) Hakim Shaikh Jalaluddin Amrohi (one of the pupils of Hakim 'Alavi Khan) and learnt *Tibb* from him for ten years); famous for his works: *Qarabadin-i Jalali* and *Sharah-i Mujaz* titled *al a-Sharah al-Jalali,*ms. extant in Raza Library, Rampur; (vii) Hakim Sayyed 'Inayatullah Bilgrami (in addition to medicine, he had deep insight into the Islamic jurisprudence; died in 1709);[76] (viii) Hakim Inayatullah b. Muhammad Sharif Kashmiri (a renowned Kashmiri physician who died in Kashmir in 1714); (ix) Hakim 'Abdurrazzaq Isfahani (he is also mentioned among the physicians who flourished in the reign of 'Alamgir, died in 1716); (x) Hakim Sayed Muhammad Baqir b. Muhammad Ja'fer Hussaini Batnavi (born in Batna in 1661). Besides *tibb*, he learnt astronomy, geometry and mathematics from Hakim Jalaluddin. After the death of his father, he shifted to Jaunpur, where he was given the title of 'Sufi' by Shaikh Muhammad Arshad b. Muhammad Rashid Jaunpuri; died in Jaunpur in 1717 and was buried there; (xi) Hakim Shaikh Ghulam Mustafa Muradabadi excelled in *tibb* as well as astronomy, poetry and literature, calligraphy, linguistics and science of warfare. During the days of Aurangzeb, he served with the royal army in the Deccan for some time and then began practising medicine; died in 1730; (xii) Hakim Muhammad Qasim Dehlavi (a skilful physician; honoured with the title of Nawab Hadhiq al-Mulk); (xiii) Hakim Mir Muhammad Husain Shirazi (born in Khurasan) and made Shiraz as his homeland, first he received education from his father, Muhammad Hadi Khan 'Aqili 'Alavi Shirazi and then completed it with Hakim Mir Muhammad 'Ali Hussaini, studied extensively the works of Hakim 'Alwi Khan, was an expert in the treatment of diseases as mentioned in *Matrah al-Anzar* [77]; author of a voluminous book on simple drugs which is very well known and is consulted by the Unani practitioners even today; *Qarabadin-i Kabir*', its original title being *Majma'al-jawama' wa Dhakha'ir al-Tarkib* (1771); *Khulasat al-Hikmat* (1781); *Mu'alijat-i Amraz* (pub. in Calcutta in 1859); *Risalah fi al-Judri wa al-Hasbah wa al-Humaiqa; Risalah fi Umm al-Sibyan, Risalah fi'Irq al-Madani, Risalah fi al-Khatan and Risalah fi Dhat al-Janb le Atfal,* died in 1790[78] was buried in Varanasi; (xiv) Hakim Mirza Muhammad b. Ali Muhammad Gilani (a prominent physician during the reign of Muhammad Shah); compiled a treatise on sex entitled Matab al- Mubashirin; (xv) Hakim Ghribullah b. Mohiuddin Nowtani (educated in Oudh, Lucknow) and then came to Delhi, learnt *Tibb* from Hakim Muhammad Zafar Jaunpuri and settled in Delhi; a skilful and popular physician during the days of Muhammad Shah; (xvi) Hakim 'Ataullah Akbarabadi also a skilful physician; Hakim Sanaullah, Hakim Ahsanullah and many other physicians learnt *tibb* from him, died in 1747; (xvii) Hakim Hidayatullah, known as a knowledgeable and experienced physician during the reign of Muhammad Shah; wrote *Sayr al-'Ilaj* in Persian in 1713, which describes the treatment of different diseases by the easily available

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drugs;(xviii) Hakim Muhammad 'Abid Sirhindi (a famous physician of Sirhind but later lived in Delhi), was the teacher of the famous Hakim Sharif Khan; his annotation on Shar al-Asbab wa al-'Alamat written in 1728 is very popular; died in 1739; (ixx) Hakim Muhammad Siddiq Kashmiri (a skilful Kashmiri physician), who died in 1761; (xx) Hakim Shaikh Muhammad b. Abu Muhammad Sindhi (a famous physician, known for his treatise on eye disease); (xxi) Hakim Isra'il Khan (also a famous physician during the Shah 'Alam's reign); honoured with the title of Hakim al Mumalik and the rank of 6000; (xxii) Hakim Iskandar Khan (a resident of Kurnool), practised medicine during the rule of Ahmad Shah (1748-1753); (xxiii) Hakim 'Abdussalam Burhanpuri (a skilful physician), who used to practise medicine as well as teach students of medicine; wrote the book Qarabadin-i Islami; died in 1799; (xiv) Hakim Muhammad Sharif Khan (a very well-known physician who flourished during the reign of Shah 'Alam II; see pp 50-52); (xxv) Hakim Muhammad Mehdi b. Muhammad Jaf'er (a noted physician during the reign of Shah 'Alam II); wrote two famous books, Makhzan-i Asrar-i Atibba' (on simple drugs) and Ma'dan-i Tajrabat (on compound drugs); (xvi) Hakim Razi Khan b. Qutbuddin Khan (flourished during the reign of Shah'Alam II); wrote a book fawa'id-i Ma'dah fi Tadbir-i Zu'f-i Ma'dah in 1173 A.H); and (xvii) Hakim Mazhar Muzaffar (an expert physician during the reign of Shah 'Alam); wrote *Khulasat al-'Aysh 'Alam Shahi* and dedicated it to the king, as is evident from its title.

Besides the aforesaid physicians, there were many other well-experienced Unani practitioners such as Hakim Mohammad Murshid (Mohammad Shah's reign), Hakim Akmal Khan (Mohd. Shah's reign), Hakim Raziuddin (Ahmad Shah's reign) Hakim Firoz 'Ali Khan (Shah 'Alam's reign), Hakim Hasan 'Ali Khan (Shah'Alam's reign), Mutamad al-Mulk Hakim Mohammad Ishaque Khan, (the author of Sharah-i Qanun named, Ghayat al-Fuhurm Fitadbir al-Humum, and other medical works) (Shah Alam's reign), Hakim Mohammad Laqa Khan (Shah 'Alam's reign), Hakim Salamat 'Ali Khan (Shah 'Alam's reign), Hakim Isra'il Khan (Shah 'Alam's reign), Hakim Ahsanullah Khan (Akbar Shah Thani's reign), Hakim Imamuddin (Akbar Shah Thani's reign), Hakim Mohammad Ashraf Khan (Akbar Shah Thani's reign), to name the more important ones.

Unani during the Post-Mughal Period

There were many families of Hakims who played an important role in the development of Unani medicine during the last days of Mughal period and even thereafter. Among those families, the Sharifi family of Delhi and the 'Azizi family of Lucknow are worthy of note.

Sharifi Family

The family had a sense of pride being connected with Hazrat Khwajah 'Abdullah Ahrar (d.1490), a Sufi saint[79] who lived in Samarqand (during the reign of Tamerlane) and who was succeeded by his son Khwajah Mohammad 'Abdullah known as Khwajah Kalan. Tamerlane and the other rulers of Samarqand held this family in great esteem. When

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Babur invaded India in 1526, he brought with him Khwajah Mohammad Yusuf, son of Khwajah Kalan, so that with his blessings, he might capture India.

Later, his two brothers named Khwajah Khawand Mahmud and Khwajah 'Abdul Shahid came to India.[80] The former, who had received his medical education from Hakim 'Imaduddin Mahmood in Shiraz (Iran), acquired fame as physician during the reign of Emperor Humayun. He, after a short stay in India, returned to Kabul where he died.[81] Khwajah 'Abdul Shahid came to India during the reign of Akbar and received extraordinary honour and respect by from Emperor. He, like his brother, did not stay permanently and after 18 years stay in India (mostly in the Punjab), went back to Samarqand where he died.[82]

After a long gap of eight generations, in 1576-77, two noted personalities—Mulla 'Ali Qari and Mulla 'Ali Da'ud—were born in the family of Khwajah Mohammad Yusuf. Fazil Khan, the son of the latter, received medical education and soon attained fame in this field. His son Wasil Khan, also a learned physician, was called by Emperor Aurangzeb from Agra to Delhi where he settled.[83] Wasil Khan had two sons named Hakim Mohammad Akmal Khan and Hakim Mohammad Ajmal Khan-I. After the death of their father, they learnt Unani medicine from a reputed physician, Hakim 'Alavi Khan, by the order of Emperor Mohammad Shah. Hakim Akmal Khan had three sons, Hakim Saeed Khan, Hakim Mahmood Khan and Hakim Sharif Khan, and the famed Sharifi family is named after the last mentioned Hakim.

This family verily rendered a wide and varied medical service. It produced many physicians who restored the lost honour and dignity to Unani medicine. They established *Tibbi* schools for the development of Unani medicine in India and added valuable works enriching the treasure of tibb in theory and practice. The noted physicians of this family and their works are being described here.

Hakim Sharif Khan was born in Delhi in 1725, and received religious and rational education in the noted school (*Madrasah*) of Shah 'abdul 'Aziz Dehlavi as well as from Hakim 'Abid Sirhindi and Hakim Achchay Khan. He learnt the practical side of healing art from his father Hakim Mohammad Akmal Khan and uncle Muhammad Ajmal Khan-I. Thereafter, he started his family clinic and became famous. He was also the court physician of Shah 'Alam-II (1759-1806). He was awarded a fief and the title of *Ashraf al Hukama*', in recognition of his medical services.

The works of Sharif Khan, which are available even today, are a living testimony to his vast knowledge and medical excellence and these have received wide acclaim from men of learning. Some of his important works are: (i) *'Ilaj al-Amraz*: It is a *qarabadin* (Unani pharmacopoeia) consisting of compound prescriptions arranged disease-wise. It has been published (432 pages) in 1879, and later in 1903; (ii)*Talif-i Sharifi*: In this most important book of Hakim Sharif Khan, the Hakim had elucidated the properties and actions of Indian drugs and foods. He has given Persian names of the drugs with their Hindi names. The book was printed in 1849, and its English translation was published under the title, *Indian Materia Medica* in 1833; (iii) *Matab-i Sharif Khan*: It is the most valuable notebook or medical diary of the Hakim. It may be pointed out that Hakim 'Alavi Khan had given him a number of prescriptions from time to time and honoured him with

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tested prescriptions of his father and other family elders. This notebook comprises all these prescriptions; (iv) *Hashiyah Sharah al-Asbab wa al-'Alamat (Fawa'id-i Sharifiyah)*: An annotation on the famous book of Nafis b. 'Aywaz Kirmani, this work is known as *Sharah al-Asbab wa al-'Alamat*. One manuscript copy of this annotation is available in Khuda Bakhsh Oriental Public Library; (v) *Madarik al-Hikam (Hashiyah-i Nafisi)*: An annotation on Kulliyat-i Nafisi (abridgement of *Mujaz al-Qanun* by Nafis b. 'Aywaz Kirmani), and related to an explanation of the first chapter (*Fann-i Awwal*) of that work, the manuscript copies of this work are available in Riza Library, Oriental Manuscripts Library, and Khuda Bakhsh Oriental Public Library. The other important treatises of Hakim Sharif Khan are: *Tarjamah-i Kulliyat-i Qanun* (now not available); *Tarjamah wa Hashiyah-i Qanun; Sharah-i Mujaz (Mujaz al-Qanun); Tuhfah-i 'Alam Shaihi; 'Ujalah-i Nafa'yah; Risalah Khawas al-Jawahir* (printed on the margin of *Talif-i sharifi* by Akmal-al Mataba' Delhi); *Risalah Dar 'Ilaj-i Hummiyat; Dastur al-Fasd, Risalah Quwwat-i Bah, Risalah chub chini and Risalah Ma'al-Jubn.* The last four treatises have been lost. Hakim Sharif Khan died in 1807 and was buried in the southern part of the mosque near the mausoleum of Hazrat Bakhtiar Kaki, at Mehrauli, Delhi.

Hakim Sadiq 'Ali Khan, the third son of Hakim Sharif Khan, was born in Delhi in 1771, learnt Persian from his father and also studied medical books under his guidance. He was 36 years old when Hakim Sharif Khan died and, in accordance with the family tradition, Hakim Sadiq 'Ali succeeded him and was attached to the court of the Mughal Emperor, Abu al-Nasr Mu'inuddin Akbar Shah b.Shah 'Alam (d.1837). He was honoured with fief by the king for his medical services, which, however, was confiscated by the British Government in 1857. He was also interested in scholarly activities and wrote the following: *(i) Sharah-i Tashrih-i A'aza'-i Murakkabah; (ii) Zad-i Gharib; (iii) Tariq-i Ta'lim-i Tiflan; (iv) Risalah der Khawas-i Adwiyah wa Aghziah;and (v) Sharah-i Mu'alijat-i Qanunchah.* The first and the last are connected with *al-Qanun* of Ibn Sina. The former, published in Delhi, is not only a commentary on the part of *Al-Qanun* titled *Tashrih-i A'aza-i Murakkabah*, but also contains extracts from *Manafa' al-A'aza'* (physiology) of Galen, Sharah-i Hakim 'Ali Gilani and Sharah-i Amoli. The latter (incomplete) deals only with the diseases of chest; its manuscript is available in the Central Library, Jamia Hamdard. Lad-i Gharib describes problems related to travelling by sea and land. It was translated into Urdu by the late Hakim Kabiruddin and published in1927. Hakim Sadiq 'Ali Khan died in Delhi in 1848 and is buried in the mausoleum of Sayyed Hasan Rasul in Delhi.

After the death of Hakim Sadiq 'Ali, his son Hakim Ghulam Mahmud Khan occupied the family seat of medical practice.[84] He is the author of *Ziya'al -Absar* (144 pages published in 1847). He died in 1892 and was succeeded by his three sons, Hakim 'Abdul Majid Khan (d.1901), Hakim Wasil Khan (d.1904) and Hakim Ajmal Khan (d. 1927), one after another. They held aloft the torch of honour of the Sharifi family as well as of *Tibb*. The medical services of Hakim Ajmal Khan deserve special mention.

The youngest of the three brothers, Ajmal Khan was born in Delhi on February 11, 1868. After memorizing the *Holy Quran*, he started learning Arabic and Persian along with the then prevalent religious education. In accordance with the family tradition, he

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learnt Unani medicine from his father as well as his elder brother, and studied *Al-Qanun* of Ibn Sina from Hakim Ghulam Riza Khan.

Hakim Ajmal Khan was an experienced physician and a prolific writer. He is the author of the following medical works:[85] (i) *Al-Tuhfat al-Hamidiyal fi'l Sana'at al-'Taklisiyal; (ii) Al-Wajizah; (iii) Muqaddimat al-Lughat al-Tibbiyah; (iv) Al-Qawl al Marghub Fi'l Maial-Mashrub; (v) Al-Bayan al-Hasan Be Sharah al-Majun alu-Masamma Sa'atiyah; Be Iksir al- Badan; (vi) Al-Satiyah;(vii) Al-Masa 'il al-Khamsah; (viii) Awraq Muzharah Musmirah Musfirah; (ix) Haziq; and (x) Al-Ta'un.*

The valuable services of Hakim Ajmal Khan to the advancement of Unani medicine in India are manifold. He established educational institutions and research units. Among them are : (i) ***Hindustani Dawakhana*:** Initially, it was known as Unani and Ayurvedic Medicines Company Ltd. Though established by Hakim Wasil Khan on the advice of Hakim Ajmal Khan, it made great progress when Hakim Ajmal Khan began to look after it. Tibbia College and other institutions were run by the income of this company; (ii) **Madrasah Tibbiyah Zananah:** (Women Tibbiyah School): This medical school was established for imparting education and practical training to women in obstetrics (inaugurated by the wife of Sir Louis Dean, the Governor of Punjab, on January 13,1909); (iii) **Tibbiyah College:** This came into being in 1916 from the resources of Hakim Ajmal Khan for the promotion of Unani medicine. The foundation stone of Tibbiyah College was laid by the Viceroy of India and, after its completion, it was inaugurated by Mahatma Gandhi in 1921. It is still functioning harmoniously as a centre of education of both Unani and Ayurveda; (iv) **Research Unit:** This was started in the Tibbiyah College to carry out research on Indian herbs by modern scientific methods. An Indian medicinal plant named *Asrowl (Rauwolfia serpentina)* was selected for research. Several alkaloids, such as Ajmaline, Ajmalinine, Isoajmaline, Neoajmaline etc. were isolated and named after Hakim Ajmal Khan in his honour.

Besides research on Indian herbs, a literary research scheme was also launched by Hakim Ajmal Khan to prepare text books on different subjects of Unani medicine. Under this scheme, a monograph entitled *Qanuni 'Asri* was compiled by Hakim Mohammad Ilyas Khan, which deals with the fundamentals of Unani medicine in a scientific manner.

The British Government in India lauded the contribution of Hakim Ajmal Khan to the development of Unani medicine in India as well as his selfless services to the humanity as a physician, and conferred on him the title of *Haziq al-Mulk* in 1907. Since Hakim Ajmal Khan was a great patriot, he renounced this title after World War I because of the oppressive policies of the British towards Muslim countries. However, in appreciation of his courageous step, the Muslim community itself gave him the title of *Masih al-Mulk* in 1921, six years before his death, on December 27,1927.[86]

Azizi Family

Medical services of the well-known 'Azizi family, indebted to the Iranian physicians like the Sharifi family, began when the Mughal empire was breathing its last and its power had fallen into the hands of the British. This family played a prominent role in the

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development of Unani medicine even in those tumultuous days. Some famous physicians of this family are described below:

Hakim Muhammad Ya'qub: He was born in Lucknow in 1790 during the reign of Nawab Asifuddawla (1775-1797), and was the pupil of Hakim Asghar Hussaini Isfahani. Sooner, he obtained great fame and popularity, and was noted for his prescription of drugs as well as only those medicines which he had found efficacious and useful from experience.

Hakim 'Abdul' Aziz: 'Azizi family derived its name from the illustrious physician Hakim 'Abdul 'Aziz, who was the son of Hakim Muhammad Isma'il and grandson of Hakim Muhammad Ya'qub. He was born in 1855, and received medical education from his grandfather as well as from his uncle Hakim Muhammad Ibrahim.

The Hakim was very knowledgeable in *tibb* and a great admirer of *al-Qanun* of Ibn Sina. He had even remembered parts of this encyclopaedic book by heart, and despite his busy clinic and other pre-occupations, he used to devote time to the study and writing medical books. He wrote a treatise titled *Tohfah-i 'Azizi* on compound drugs, which was published in 1888. In addition, the Hakim has left behind a great medical treasure comprising his tested prescriptions. Besides, he made serious efforts for the progress of Unani medicine throughout his life. He founded in 1902, a medical school called *Takimiluttib*, which is now a college. He died on October 13,1911.

The other famous physicians, who added laurels to the greatness of the family in medicine, include Shifa al- Mulk Hakim 'Abdurrashid (d.1920), Shifa' al-Mulk Hakim 'Abdul Hamid (d.1940), Shifa' al-Mulk Hakim Abdul Muid (d.1969), and Shifa' al-Mulk Hakim 'Abdul Latif (d.1970).[87]

Hakim 'Abdul Latif translated the famous medical treatise *al-Adwiyat al-Qalbiyah* of Ibn Sina from Arabic into Urdu, which was published in 1956. The English translation of this work was carried out jointly by the Institute of History of Medicine and Medical Research, (now Faculty of Science, Jamia Hamdard), New Delhi, and the Institute of Tibbi Research, Karachi (Pakistan), and was published by the Hamdard Foundation, Karachi, in 1982. Hakim 'Abdul Latif has also written some other books on medicine (*Tibb*), which will be described later.

Unani in the British Period

After the defeat of Siraj al-Dawla at Pilasi (1757) and Shah 'Alam's rout at Baksar (1764), the British power in India began gathering momentum, as the British army captured other parts of Bengal, Bihar and Hyderabad in 1798. After the death of Tipu Sultan (1799), the whole of south was also subjugated. The State of Oudh was annexed in 1800, and the throne of Delhi was snatched in 1803.

The new colonial rulers of India not only established their political authority throughout the country, but also became a culturally dominant force overshadowing other cultural identities. They endeavoured to bring in a new thinking and culture alien to Indian ethos. Apart from science and technology, they had also a quite different healing system called the Western medicine or allopathy.

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Naturally, the colonial masters did not like the Indian systems of medicine (Unani and Ayurveda), and created many hindrances to their progress. They banned the practice of Unani and Ayurveda on the pretext that these ancient systems were not the scientific ones. This unjust treatment created resentment among the practitioners of Unani and Ayurveda. Consequently, under the able guidance of Hakim Ajmal Khan, the great physician and nationalist, both the Hakims and Ayurvedic pandits started their struggle to safeguard their ancient medical heritage from being destroyed. Eventually, the colonial Government was forced to lift the ban on the practice of Unani and Ayurveda. Despite the regressive attitude of the British Government, the progress of Unani medicine continued unabated. In addition to the medical families, as stated before, there were many learned physicians during this period. Hakim Ghulam Husnain Kanturi and Hakim Ghulam Jilani were prominent among them.

Hakim Ghulam Husnain was born in Kanpur, a town in the district of Barabanki (U.P.), in 1829, and was an experienced physician as well as a prolific writer and translator. He rendered into Urdu some treatises such as. *Kamil al Sana 'ah* of Ibn 'Abbas Majusi, *Al-Qanun fi'l Tibb* of Ibn Sina, *Zakhirah al-Khawarazmshahi* of Ismail Jurjani, *Qanunchah* of Chaghmani. He also rendered *Fusul-i Buqratiyah* into Persian. He died at Faizabad (U.P.) on 17th December, 1918, and was buried at Kanpur, his ancestral home.

Hakim Ghulam Jilani was born in Lahore (now in Pakistan) on 15th May, 1873. After learning Arabic and Persian languages, he studied Unani medicine and acquired expertise in it. In recognition of his medical services, the British Government in India conferred on him the title of *Khan Saheb*. During his stay in Iran, as a medical officer at the British embassy, the then Iranian Government bestowed on him the title of *Shams al-Atibba'*. Being an experienced physician, he also wrote *Materia Medica* (Urdu), *Makhzan-i Hikmat, Tarikh al-Atibba' and Makhzan al-Jawahir* (Tibbi dictionary), which are well-known books on Unani medicine. He died in Lahore in 1926.

During the British period, the Indian states such as Rampur, Taunk, Patiala, Bhopal and Hyderabad gave full patronage to Unani medicine. In this connection, the services of Hyderabad and Bhopal states are noteworthy. Many learned scholars and Hakims were encouraged and thus contributed to the development of Unani medicine in Hyderabad. Among the state physicians, Hakim Ahmadullah, the author of a number of medical treatises, Hakim Riza 'Ali Khan, the author of Yadgar-i Riza'i, and Hakim Saeed Ahmad Amrohi, the author of *Kamil al-Tashkhis* (thirteen volumes), deserve special mention.

Among the non-physicians, Shah Nawaz Khan (d.1758) and Maulana Azad Bilagrami (d.1785) are worth mentioning. They were great scholars and historians of their time. The works, *Maathir al- Umara'* by the former and *Sarv-i Azad, Maathir al-Karam, Khazanah-i 'Amrah* and *Subhat al-Marjan*, by the latter, are still regarded as authentic source of information about the life and works of Unani physicians, as well as those of scholars of other disciplines, belonging to the Mughal period.

The services of Dai'rat al Ma'arif, Hyderabad, is also commendable. It published a large number of rare books on different subjects in Arabic and Persian including the famous encyclopaedic work of Al-Razi titled *Kitab al-Hawi*, comprising twenty three volumes. Nizamia Tibbia college, established by the last ruler of the State, Usman 'Ali Khan (1911-56), has been playing an important role in the progress of Unani medicine.

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Among the physicians connected with the state of Bhopal, Hakim Mohammad Azam Khan was a distinguished physician. He was born in Rampur, (U.P) in 1806 and, at the age of twenty two years, he went to Bhopal and was employed there as a personal physician of Jahangir Mohammad Khan *alias* Nawab Dolah. Later, he left Bhopal and was attached to the state of Indur, and died there in 1902. He is the author of the following books: (i) *Iksir Azam* (on the treatment of diseases), (*Mu'alijat)*, and consists of four volumes;) published several times); (ii) *Rumuz-i Azam* (also on *Mu'alijat* and comprises two volumes) published; (iii) *Muhit-i Azam* (on compound drugs, *Murakkabat*) published; (v) *Nayyar-i Azam* (on the art of pulse examination; he compiled also a medical dictionary, *Lughat-i Tibbiyah)*; unpublished.

It is refreshing to note that a number of colleges of Unani medicine were established even during the British reign in different parts of the country, such as the Ayurvedic and Tibbia College, Karol Bagh, New Delhi; Takmiluttib College, Lucknow (U.P.); Ajmal Khan Tibbia College, Aligarh (U.P); Nizamia Tibbia College, Hyderabad (A.P); and Jamia Tibbia New Delhi, which have contributed a great deal to the advancement of Unani medicine, by producing a number of highly skilful physicians. Hakim Mohammad Ilyas Khan, Hakim Mohammad Kabiruddin, Hakim Abdul' Latif (Falsafi), Hakim Khawaja Rizwan Ahmad, Hakim Syed Ahmed Ali Nayyer Wasti, Hakim Shakeel Ahmad Shamsi, Hakim Syed Ishtiaq Ahmad and many others were the products of these colleges.

Hakim Mohammad Ilyas Khan, an able physician and scholar of Unani medicine, was born in Etah (U.P.), and after completion of (*Tibbi*) education in Madrasah Tibbia of Hakim Abdal Majeed Dehlavi, he started his clinic at his native town. In 1907, he was appointed a physician at the Unani hospital established by Wiqar al-Mulk at Aligarh Mohammadan College for the medical treatment of teachers and students. In 1921, on the call of Hakim Ajmal Khan, he joined Tibbia College, Karol Bagh, New Delhi. In addition to teaching, he used to assist Hakim Ajmal Khan in the administration of this College. As noted earlier, Hakim Ajmal Khan established a Literary Research Academy of which he was the president, and Hakim Ilyas Khan was the secretary. This academy augmented the progress of Unani medicine in many ways.

Hakim Ilyas Khan was also the founder of Hamdard Tibbi College, now of Hamdard University, New Delhi, which was earlier known as Jamia Tibbia. After Independence, Hakim Ilyas Khan established the All India Unani Tibbi Conference for the uplift of Unani medicine and was, in fact, its moving spirit. In addition, he was a versatile scholar and writer. His work *Qanun-i 'Asri*, is a witness to his deep knowledge of Unani medicine, as well as his acquaintance with modern medical information. This towering personality of Unani medicine died on the 26th February, 1963, and was buried at the graveyard of Mahdiyan in Delhi, according to his wish.

Hakim Mohammad Kabiruddin's contribution to the development of Unani medicine is unforgettable. He was born in Mongeir (Bihar) in 1889, and graduated in Unani medicine from Jamia Tibbia, Gali Qasim Jan (Delhi). Hakim Ajmal Khan was one of his teachers. In 1914, a department had been established at the College by Hakim Ajmal Khan for the compilation of books on Unani medicine, based on modern knowledge. Hakim Kabiruddin was deputed to look after the academic activities of the department,

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as he was an unparalleled scholar and teacher of Tibb. He taught at the Ayurvedic and Tibbia College for a long time (1917-1932), and Jamia Tibbia, for a few years. In 1939, he was called by the Nizam of Hyderabad to serve Nizamia Tibbia College as Vice-Principal. He remained there till 1948, and was conferred the title of the *King of Pen* by the Nizam.

In 1957, he joined Ajmal Khan Tibbia College staff and taught there till 1960. He returned to Delhi in 1962, and lived there till his last breath (9th January 1976). He wrote the following books:(i) *Tarjamah-i Kabir* (4 parts); (ii) *Bayaz-i Kabir*; (iii) *Ifadah-i Kabir*; (iv) *Tashrih-i Kabir*; (v) *Tashrih-i Saghir*; (vi) *Kitab al-Jarahat*; (vii) *Manafi' al-A'za' (manaf-i Kabir)*; (viii) *Burhan*; (ix) *Armughan*; (x) *Kibat al-Akhlat*; (xi) *Lughat-i Kabir*; *(Kulliyat-i Advia)*; (xiii)*Kitab al-Advia*; (xiv) *Risalah Atashak*; (xv) *Risalah Suzak*; (xvi) *Risalah Awzan-i Advia*; (xvii) *Risalah Bawasir*; and (xviii) *Risalah Burhan.*

He is stated to have also written another twenty books:

(i) *Tarjamah-i Kulliyat-i Qanun*; (ii) *Tarjumah-i Hummiyat-i Qanun*; (iii) *Tarjumah wa Sharah-i Kulliyat-i Nafisi*; (iv) *Tarjamah-i Qanunchah*; (v) *Tarjamah-i Mizan al-Tibb*; (vi) *Tarjamah-i Makhazin al-Ta'lim'* (vii) *al-Iksir*; (viii) *Makhzan-i Mufridat (Kitab al-Advia, part II)*; (ix) *'Ilaj al Amraz*; (x) *Al-Qarabadin*; (xi) *Kitab al-Taklis*; (xii) *Kitab al-Tashkhis*; (xiii) *Hummiyat-i Ijamia*; (xiv) *Risalah Azaraqi*; (xv) *Risalah Judri*; (xvi) *Risalah Ziabitus*; (xvii) *Risalah Ta'un*; (xviii) *Risalah Haiza*; (ixx) *Risalah Samm al-Far*; and (xx) *Risalah Madar*. Most of the books have been wrongly attributed to Hakim Kabiruddin. Other learned Hakims, such as Hakim Mohammad Yahya Khan, Hakim Khawaja Rizwan Ahmed, and Hakim'Abdul Wahid were also involved in writing these books.

Hakim Kabiruddin had established a publishing bureau named after Al Masih, Delhi. The above stated physicians were associated with the bureau, and assisted Hakim Kabiruddin in the compilation of books on Unani medicine, and also translating into Urdu the important classical Tibbi literature which were in Arabic and Persian languages. These books, which have been published by Al-Masih, promoted the advancement of Unani medicine.

Hakim Abdul Latif (Falsafi) has been dealt with, in brief in the previous pages, in the context of the medical families. He was born in Lucknow on 29th April, 1900, and after completion of his Tibbi education, he started teaching at Takmilluttib College besides practising in his clinic. Later, in 1927, he joined Ajmal Khan Tibbia College, Aligarh, and served there as a teacher, Vice-Principal and Principal till 1961. During his principalship, Unani medicine made significant progress. He relinquished the principalship in 1961 and, after serving Hamdard Tibbi College, Delhi, for a few years, he retired to his ancestral place, Lucknow, and died there on 4th November 1970. He wrote the following books: (i) *Hamari Tibb Mein Hinduwon Ka Sajha*; (ii) *Mukhtasar Tarikh wa Manafi-i Tashrih wa Jarahat;* (iii) *Kitab Al-Nabz*; (iv) *Kitab Al-Adviat al-Qalbiyah (Urdu translation of Ibn Sina's tract)*; (v) *Al-Tahqiq al-Matlub Fi'l Ma'al-Mashrub*; (vi) *Tahqiq al-Maqal fi Ta'rif al-E'tedal*; (vii) *Tibb awr Science*; (vii) *Hamari Scientific Tibb*; (ix) *Tajdid-i Tibb; (collection of articles)*; (x) *Majmu'ah-i Mazamin* (approx.1000 pages; unpublished).

Hakim Khawaja Rizwan Ahmed was born in Bijnauar (U.P.), in 1906. He received his Tibbi education from Takmiluttib College, Lucknow, and completing it in 1924, he taught

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at various Tibbia Colleges, such as Patna Tibbia College, and Tibbia College, Karol Bagh, New Delhi. After partition, he migrated to Sylhet (then East Pakistan) and served Sylhet Tibbia College as its Principal. He retired in 1967, settled in Karachi permanently and died there, in 1972.

Hakim Rizwan Ahmad was next to Hakim Kabiruddin, in the matter of translation of Unani books in Arabic language into Urdu. The following translations and also original works bear testimony to his translating ability as well as his erudition in Unani medicine:

(i) Tarjamah-i Sharah-i Asbab Ma'Hashiah Sharif Khan; (ii) Tarjamah 'Ilaj al-Amraz; (iii) Tarjamah-i Mujaz al-Qanun; (iv) Trajamah-i Kulliyat-i Nafisi; (v) Tarjamah-i Hummiyat-i Qanun; (vi) Tarjamah-i wa Sharah-i Kulliyat-i Qanun; (vii) Manafi'al-A'za'; (viii) Amraz-i Atfal; (ix) Tibb-i Qanuni (Medical Jurisprudence); (x) Kitab al-Sumum'; (xi) Delhi ka Sahih Matab; (xii) Delhi ke Sahih Murakkabat; (xiii) 'Ilaj al-Jarrahi.

Hakim Syed 'Ali Ahmad Nayyar Wasti was also born in Bijnaur, but six years earlier. He got his *tibbi* education from Takmiluttib College, Lucknow, migrated to Pakistan in 1964, and died there, in 1985. He was an experienced physician and scholar of high merit.

His writings and clinical in-depth were recognized even by his contemporary physicians. His comprehensive commentary on the *Arabian Medicine* of E.G. Brown, entitled *Tibb al-'Arab*, earned for him fame and popularity. His other book is *Tarikh-i Rawabit-i Pezishki-i Iran wa Pakistan* in Persian, which deals with the history of Unani medicine in the Indian sub-continent.

Hakim Shakeel Ahmed Shamsi was born in Rampur (U.P.) in 1913. He received his *Tibbi* education also from Takmiluttib College in 1933. He served his *alma mater* as Vice-Principal and Principal till his retirement in 1965. Later, he became the Secretary of the College and died in Lucknow on 12th November, 1985. A man of high literary merit, Hakim Shakeel Ahmed Shamsi was a highly accomplished and experienced physician. He wrote a few books on Unani medicine, among which *Kitab al-wiladat* is popular, and it has been reprinted several times.

Hakim Syed Ishtiaq Ahmad was born in Azamgarh (U.P.) on 2nd July, 1937. After completion of his *Tibbi* education from Tibbia College Aligarh in 1960, he started his own clinic at Azamgarh. Later, he joined Tibbia College (Aligarh) as a teacher of anatomy. In 1975, he joined Tibbia College, Karol Bagh, New Delhi. He taught also at Unani Medical College, Bangalore, where he was appointed Professor in 1982, and two years later, he returned to teaching at Tibbia College, Karol Bagh, New Delhi and died in 1995.

Hakim Ishtiaq Ahmed was an extraordinary scholar of Unani medicine. In addition to numerous research papers, he authored the following books:

(i) *Mera Nazriah-i Mizaj*; (ii) *Haqiqat-i Akhlat*: (iii) *Tibb Eik Falsafah ya Science*; (iv) *Kulliyat-i 'Asri (Urdu)*; and (v) *Introduction to Al-Umur al-Tabi'iyah (English)*.

The last two are in Urdu and English languages, respectively. Both of them deal with the basic fundamentals of Unani medicine, in which the author has delightedly tried to establish conformity between the basic principles of Unani medicine and those of modern physiology. The last-mentioned book was the only book on the fundamentals of Unani medicine in English till the work of the author of this chapter titled: *Basic Concepts of Unani Medicine- A Critical Study* (published by Hamdard University, New Delhi, in 1995).

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Unani, After Independence

After independence, the development of Unani received further impetus. More than a dozen new colleges were opened in different parts of the country: Government Unani Medical College, (Bangalore); Dr. Abdul Haque Tibbia College and Hospital (Kurnool, A.P); Saifiyah Hamidiah Unani Medical College (Burhanpur M.P.); Unani medical College (Pune, Maharastra); Tibbia College and Hospital (Nagpur, Bombay); College of Indian System of Medicine (Madras, now called Chennai); and Ibn Sina Tibbia College (Azamgrah, U.P.), are among them.

The Government of India also took a keen interest in the development of Unani medicine. In 1969, it set up the Central Council for Research in Indian Medicine and Homoeopathy. In 1979, the council was bifurcated into three separate councils, and thus the Central Council for Research in Unani Medicine (CCRUM) came into existence. Apart from clinical and pharmacological research on Unani drugs, the Unani Council has also concentrated on the literary work. Many classical Tibbi literature in Arabic language have been rendered into Urdu, e.g. *Al-Jami' le Mufridat al-Advia* by Ibn Baytar, *Kitab al-Kulliyat* by Ibn Rushd, *Kitab al-Taysir* by Ibn Zuhr, *Kitab al-Abdal* by Al-Razi and *'Uyun al-Anba' Fi Tabqat al-Atibba'* by Ibn Abi Usaibiyah. These translations have contributed a great deal to the advancement of Unani medicine. But, at present, the Unani Council seems to have lost its earlier momentum, needing now rejuvenation.

The services of Hamdard Dawakhana (Waqf), New Delhi, in making popular the Unani drugs in India and abroad, are praiseworthy. Late Hakim 'Abd-al- Hameed was the President of the Hamdard National Foundation, New Delhi, which was established in 1948, and which is funded by the proceeds of Hamdard Dawakhana (pharmaceutical company of Unani drugs). A number of academic institutions, including Hamdard Tibbi College, a part of the faculty of medicine of Hamdard University, are being run by this foundation.

In the end, it may be pointed out that Unani medicine made significant strides in India during its long voyage stretching from the twelfth century to the twentieth century. The scope for the further growth of Unani medicine is very bright because of two reasons; first, the active patronage of the Central and State Governments; and secondly, people's apathy towards modern medicine (allopathy), due to its serious side effects and high cost. Nevertheless, this growth would depend on the votaries of Unani medicine and their willingness to reshape or reformulate it, in accordance with the medical needs of the present.

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47. *Science and Scientific Instruments In the Sultanate of Delhi,* p.16.
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CHAPTER 12

Indian Hakims: Their role in the medical care of India

Syed Zillur Rahman

India has the privilege of not only accepting Unani medicine, but also strongly guarding it against extinction. While this system died out, unfortunately, in Islamic countries, because of the inroads of Western (modern) medicine, India has preserved as well as promoted it, and is now the biggest centre of Unani medicine in the world.

Undoubtedly, royal patronage to Unani medicine by Indian emperors and local rulers, during the medieval period and also the establishment of government hospitals all over India, provided opportunity for the development of Unani medicine. However, Unani physicians themselves did not lag behind in making it a popular method of treatment and they did it in the following three effective ways:

(i) *Treatment*: Unani treatment came into vogue due to the expertise and curing hands of Unani physicians, who also established their private clinics in big and small cities and managed the supply of simple drugs and the preparation of compound medicines. Drug stores were opened at numerous places, and thereby facilities were provided for the treatment of the sick as well as the distribution of medicine to the general public.

(ii) *Education and Teaching*: Teaching institutions were set up at various places, where aspiring students were imparted training in Unani medicine. They did not only acquire theoretical knowledge at these centres, but also receive practical training in diagnosing diseases and writing prescriptions in the clinics of famous physicians. In fact, those private clinics became, in the course of time, a sort of educational institutions. At the same time, medical education was also imparted at government hospitals and schools. Unani medicine also formed an important discipline in the comprehensive curriculum of Islamic *madarsahs*, known as *Dars-i Nizamiya*.

(iii) *Compilation of books*: In the early period, the works of Arab and Iranian medical writers were used and consulted by Indian physicians. Soon, the compilation

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and writing of books began immediately after the Sultanate period. According to our present information and research, the first book compiled on Unani medicine in India was the Indo-Persian translation of *Kitāb al-Ṣaydana*[1] of Abu Rihan al-Biruni. It was rendered by Abu Bakr Kāsāni in 1211 A.D.[2], during the reign of Shamsuddin Iltutmish (1211-1235). In fact, more than 30 original or translated works of the Sultanate period have come to light so far to the author of this chapter.

According to Burnier, learned physicians like Badruddin Damishqi lived in India, during the reign of 'Alauddin Khilji (1256-1316). He writes: "Such physicians, as flourished in the region of 'Alauddin, have not been seen in any age or period".[3] There were 70 government hospitals in Delhi only in the kingdom of Sultan Mohammed b. Tughlaq (1325-51 A.D.), where 1200 Unani physicians were engaged in treating patients[4].

History speaks of the Mughal rule in India as the brightest period for the development and progress of art and science in general. It can also be aptly called the Golden Age of Unani medicine in India. During this period, Unani medicine rose to the same peak that it attained in eastern Arab countries during the Abbasid Caliphate and in Spain (Western Arab) during the rule of Ummayid caliphs. During that very period, hundreds of Unani physicians came to India from Central Asia, Iran and other countries. It was particularly due to the medical activities and masterpieces of those physicians that Indian cities became models of famous cities like Baghdad, Damascus, Bukhara, Samarqand, Shiraz, Isfahan, Cordova and Granada. Thus, the arrival of distinguished physicians from Islamic countries to India, which started in the beginning of the Muslim rule, continued till the fall of the Mughal Empire. A unique physician of the time, named Hakim 'Alwi Khan, arrived in India towards the end of the Mughal rule. His skillfulness, teaching ability and works highlighted the Indian contribution in the field of medicine. He is well-known as a physician, writer and teacher. Hundreds of students benefited from his lessons.

The works of Abu Bakar Muhammad, b. Zakariya Razi, Ibn Sina, Abu Sahl, 'Ali b. 'Abbās, Al-Kindi, Najibuddin Samarqandi, Ibn Nafis are still used in India as basic reference books, and Indian scholars continue doing research on them. The works of Ibn Sina and other Arabian writers have been studied with great interest. Commentaries with annotations were written on those standard works. In this way, the principles of Unani medicine were disseminated and further developed. For instance, there exist on *Al-Qanun* of Ibn Sina, detailed commentaries and glossaries.

Among the hundreds of Indian *tabibs*, who further promoted Unani medicine, the services of the following physicians are to be noted particularly: Sharfuddin Tabib, Bhowa b. Khawas Khan, Yusuf b. Muhammad, Hakim Abul Fath Gilani, Hakim 'Ali Gilani, 'Ayn-al Mulk Shirazi, Fatahullah Gilani, Amanullah Khan, Nuruddin Muhammad 'Abdullah, Nizamuddin Ahmad Gilani, Muhammad Mehdi Ardistani, Hakim 'Alwi Khan, Hakim Akbar Arzāni, Arshad Shifai Khan, Aḥmadullah, Faḍl 'Ali Shifai, Hakim Muhammad 'Azam Khan, Hakim Najmul Ghani Khan, members of Sharifi family, Na iti family and 'Azizi family.

It may be noted that Indian Unani physicians have written treatises in Arabic and Persian on every subject of medicine. The basic principles and philosophy of treatment

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propounded in Unani Medicine did not undergo any change in India. The books compiled here become very different from those written by Arab and Iranian authors. This was due to the adoption of numerous local herbs, preparations of a large number of new compound medicines, composition of parts as well as weights of prescriptions, substitution of foreign drugs not available in India by the locally produced drugs, thereby fulfilling the saying of the father of medicine, Hippocrates, that, "treatment of disease should be done by the herbs produced in the country itself". A comparison of the above-mentioned books makes this distinction very clear. *Al-Qānun* of Ibn Sina and *Al-jam'a al-Mufradāt* of Ibn Bayṭar, the eminent Arab writer, describe about 1500 drugs, while the Indian books, *Makhzan al-Adwiyah, Muḥiṭ-i 'Azam, Tālif-I Sharifi, Mufradāt-I Hindi, Yādgār-I Raḍai, Khazinat al-Adwiyah* discuss 3000 herbs. Needless to mention here that this number does include all the drugs mentioned by Arab and Iranian writers. *Iksir-i'Azam* by Hakim 'Azam Khan has been written for the treatment of diseases. It is in four volumes and is in no way inferior to the Arabic *Al-Qānun* of Ibn Sina and the Persian work, *Dhakhirah-I-Khwarazm Shahi* of Sayyid Ism'ail Jurjāni, in quality.

It is difficult to find, in any previous period, so many books written on pharmacopoeia and medical prescriptions as in India. It had always been the selected topic of India's Unani physicians. The medical treatises *Qarābadin Dārā Shikohi, Qarābadin Qādri, Majmá Al-jawamí, Qarābadin Baqai, Qarābadin Shifai, Qarābadin Dhakai, Qarābadin M'asumi, Qarābadin Akmal, Qarābadin Salāmi, 'Iiaj Al-Amraḍ, Qarābadin jalali, Qarābadin Iskandari, Qarābadin Firangi, Qarābadin Aḥsan, Qarābadin 'Azam, Qarābadin Najmul Ghani,* are a few well-known ones, among hundreds of such writings.

Although Indian *Tabibs* have left sufficient treasure in the Arabic language, their major works were compiled in Persian, which was then the state language, as well as that of science and literature. Therefore, Indian medical writers had also made Persian their medium of instruction and expression. In this connection, it is necessary to acknowledge the services of Hakim Akbar Arzāni (d. 1721), who translated the curriculum of Unani medicine into Persian. His works *Mizan Al-Tibb, Hudud Al-Amraḍ, 'Ilaj-al_Sibyān, Tibb-i Nabawi, Mujarrabāt-i Akbari, Mufaraḥ Al-Qulub,* (*Sharh Qanuncha*), *Qarābadin Qādri* and *Tibbi-i Akbar* have played an important role in popularising the education of Unani physicians in India.

A large collection of rare books on Unani medicine in Arabic and Persian is extant in Indian libraries and private collections. This rich treasure includes certain manuscripts of original works, which are available only in India and are therefore unique. For instance, a complete set of the commentary of the 16 volume textbook of Galen, written by Abul Fraj Ibn Ṭaiyyab, a contemporary of Ibn Sina, is available in the present author's collection. It is unique, and according to Sezgin, an incomplete set of this commentary is extant in Turkey. The publication of voluminous works on Unani medicine, which could not be published in Islamic countries, has been continuing in India unabated. It includes books like *Al-Hāwi* of Muhammad b. Zakariyah Rāzi; 25 volumes of this important work have been published so far. Since the 18th century, translation of important Arabic and Persian medical works and textbooks into Urdu as well as the compilation of independent works in Urdu began when Urdu became the language of science and literature in India.

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Noted Hakims*

Ḍiyauddin 'Abdul Rafí b. 'Adbul Fath Harawi is the first-ever physician in India recorded in the annals. Although he was an expert physician attending on Khusro Malik (1160-1184 A.D.), the last Ghazni ruler of India, Rāfí was claimed to be alive until the demise of Sultan Shahabuddin Ghori (d. 1206). Nuruddin 'Awfi praised him not only for his wisdom and erudition as an expert lexicographer, but also for his consummate skills as a practitioner of the art of medicine[5].

Abu Bakr Asfar Kasani was a writer and a knowledgeable physician of the 13th century. He translated Abu Rayhan al-Biruni's *Kitab Al-Ṣaydna*[6] from Arabic into Persian, during the reign of Sultan Shamsuddin Iltutmish[7] (1211-1235 A.D.). Manuscript copies of this translation are extant in the British Museum (London), University collection of Maulana Azad Library (Aligarh), personal collection of Muhammad Shafí (Lahore)[8], and in Tehran[9]. This translation may be considered as the first work of Unani medicine written in India (the publication by Iraj Afshār from Tehran in 1973 is, however, incomplete). *Shamsuḍdin* was a distinguished physician in the time of Iltutmish, and his patron or mentor was Khwaja Qutbuddin Bakhtiyar Kaki. When his patron became indisposed, Hakim Shamsuddin, his spiritual disciple, was called to attend on him, as he was hailed to be an accomplished physician of his times[10].

Ḍiya Muhammad Mas'ud Rashid Zangi 'Umar Ghaznawi was the court physician of Sultan Muhammad b. Tughlaq (1325-1321), and wrote an important book *Mjmu'a Ḍiyai*. Two manuscripts of this work are extant in the Central Library of the Jamia Hamdard (Hamdard University) Hamdard Nagar, New Delhi[11]; and the State Central Library, Hyderabad[12].

Ḍiya Muhammad refers to some important works written in India. One of them is *Majm'u a Shamsi* by Khwaja Shams Mustawfi, who was the uncle of Ḍiya Muhammad. This work was also referred to by Khwaja Aṣlahullah[13]. The latter writer has used *Majm'u a Ḍiyai* as a source material or as a reference book. It is for this reason that the writers of medical works, who lived a century ago, including the early 19th century writer Hakim Mirza Ism'ail, author of *Talkhis al-Tibb*, have mentioned *Tibb-i Ḍiyai* as their source.

Badruddin Damishqi, according to Barni, was master–instructor of the physicians. He imparted knowledge to the men of medicine belonging to the entire town of Delhi. Nature was extraordinarily kind to him in so far as his erudition in medicine was concerned. Just by feeling the pulse of a patient, he could unravel the exact diagnosis[14].

The author of *Nuzhatul Khawaṭir* opines that he was an excellent physician, who could diagnose a disease judicially, feeling of pulse and observation of the urine. According to an apocryphal anecdote he was once presented with a mixture of different urines of more than one animal, in order to test his ability to diagnose. Nevertheless, he was able to see through the real game. Further, he had the distinction to analyze the most intricate matter and was known for his great skills in solving the knottiest problems in no time. Moreover, he took it upon himself to teach all that to his disciples. He excelled his

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*** The biographical notes on famous Hakims presented in this chapter are complementary to those given in the previous chapter—Editor.***

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predecessors in achieving mastery over the discourse of Ibn Sina. Residing in Delhi at the time of 'Allauddin Khilji's rule, he was really at the pinnacle of medical instruction and diagnostics. To top it all, he was a vitreous soul, bestowed with extraordinary gifts and a great power of institution[15].

Hakim Ḥamid Miṭraz, elaborating on whose exalted skills, Barni stated that there was none like Maulana Damishqi who could be at par with him in achieving diagnoses by sheer inspection of urine and feeling the pulse. By virtue of his great oratorical ability, he was such an exemplary teacher of the principle of medicine, jurisprudence, and other subjects, that he would invite envy and muted astonishment of students. Notwithstanding his mastery over the art of medicine, he was deeply interested in Sufism[16].

Hakim Ṣadruddin Markili Dehlawi b. Ḥusamuddin was not only an accomplished mystic of high order but also one of the finest physicians of his time. During the period of 'Alauddin Khilji, he had a clinic in the capital, Delhi, besides teaching medicine. Extremely wise and genius, he had a knack of getting at the root cause of a disease and making out its exact diagnosis in a few moments. He was endowed with the power of healing, and thereby cured his patients[17].

Ábdul Haq Muḥaddith Dehlawi has also reported about him as "an accomplished master over the art of medicine". A few works are to his credit; they are remarkable for their comprehensiveness and clarity. The subject-matter of his works comprises mystical preaching, counselling and bits of wisdom. His collection of letters is also available[18].

Hakim Ṣadruddin was born at the intercession of Khwaja Nizamuddin Awliya. Just after birth, he was carried to his mentor's lap[19], who patted the new born child with great affection. A piece detached from his mentor's garment became the child's clothing. Khwaja Nizamuddin further deputed the child to Naṣiruddin Chiragh Dehlawi for his grooming and education. The latter was also asked to hand over the spiritual *Khilāfat* (Viceregency) to Ṣadruddin after him; consequently, the *Chishti* order chose him as their successor. Hakim Ṣadruddin was also famous as *Dulha Tabib*, and hordes of people used to be benefited. His mausoleum is adjacent to the tomb of Naṣiruddin Chiragh Dehlawi[20]. His father Ḥusamuddin Markilli was also well-versed in medicine[21].

Hakim 'Alamuddin Shirāzi, according to the author of *Nuzhatul* Khwaṭir, was a master of medical science and the art of healing. He used to teach medicine also during the reign of 'Alauddin Khilji. Barni did not, however, hold him as belonging to Shiraz. Nevertheless, *Tārikh-i Frishtah* has mentioned him as one belonging to Shiraz. He outlived 'Alauddin Khilji, and Muhammad Shah Tughlaq made him his close friend, and he enjoyed distinction and proximity to the Sultan. Tughlaq used to have discussions with him frequently[22].

Hakim Yamani Dehlawi was an accomplished physician, who was appointed as an instructor in medicine during the reign of Sultan 'Alauddin Khilji[23].

Ilyās b. Shahāb Ḍiya (sl. 1385) was a prolific writer and physician. He wrote a book *Rahātul Insān,* and dedicated it to Sultan Firoz Shah Tughlaq. It is extant in Andhra Pradesh Oriental Library and Research Institute (Hyderabad)

Shahāb b. 'Abdul Karim Nāgawri has written a book *Tibb-i Shahābi* in 790/1388. The manuscripts of this versified tract are extant in various libraries, viz. India office (London),

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Salar Jang Museum and Osmania University (Hyderabad), Raza Library (Rampur) and Maulana Azad Library (Aligarh)[24]. It was even printed in 1856 at Kanpur.

Tibb-i Shifā al Khāni is another book of this writer, written in Persian prose in 794/1392 during the reign of Sultan Muzaffar Shah of Gujarat. It is available in Salar Jang Museum and in A.P. Government Oriental Library (Hyderabad), and in many other collections.

Manṣur b. Muhammad b.Yusuf b. Ilyās was a famous physician of his time. He was the author of *Kifayah-i Mujāhidiya* or *Kifāyah Manṣuri*. It was dedicated to Sultan Zayn al-'Abidin (1423-73) of Kashmir. It deals with practical medicine (*Mu 'alajāt),* and has been published several times. His other book *Tashriḥ-I Manṣuri* is a very popular one on anatomy. It was prescribed for the subject of anatomy in the Unani syllabus in India. Both Persian and Urdu translation of this work have been published several times.

'Ali Muhammad b. Isma 'íl Aṣāwali Aṣili translated the medical treatise of Vagbhata, the *Astangahrdayasamhita* into Persian in 1474. So far as our present knowledge is concerned, it is the first Persian translation of an Indian work on medicine. This work is dedicated to Sultan Mohammed Shah of Gujarat (1459-1511), and its title *Tibb-i Shifa-í Mahmud Shahi* is also after the Sultan's name.

Bhowa b. Khawas Khan, the noted Hakim, was a minister of Sultan Sikandar Lodhi (1489-1517) who, because of his passion for medicine, ordered his minister Hakim to embark on a work concerning Ayurvedic system of medicine. According to the Sultan's command, he wrote in 918/1512 a book *Mádan al-Shifa Sikandar Shāhi* (1512). This work has been admirably discussed in sufficient details by Zubyr Siddiqi. However, he wrongly considered it as the first work of Unani medicine written in India[25].

Khwājgi Aṣlahullāh was a learned physician and writer during the reign of Sultan Ibrāhim Lodhi (1517-1526 A.D.). He authored an illustrious book entitled *Tibbi Ibrāhim Shāhi*. The manuscript copy of this book containing 575 pages is extant in the personal collection of Sayyid 'Abdul Qadir, Lahore.[26]

Zayn al-'Abidin b. Ghayasuddin Muhammad was a good practitioner and writer. He was also known as Mulla Mir Tabib, and compiled a book *Fayḍi* in 943/1536, during the reign of Sultan Bahadur Shah Gujrat. This work is, in fact, a Persian translation of the Arabic *Khamtha* (a collection of five books) by Najibuddin Samarqandi[27] (13th cent.)

Mughal Period: The Golden Age of Unani Medicine

The Mughal period of Indian history constitutes what may be rightly described as the Golden Age of Unani medicine. During the emperorship of Babar (d. 1530 A.D.), who himself was inclined to the art of healing, there were physicians of great eminence like Khwaja Nizamuddin 'Ali Khalifa, Hakim Mir Abul Baqa, Hakim Muhammad b. Yusuf Harawi, Hakim Yusuf b. Muhammad Harawi Yusufi, Hakim Muhammad b. Ashraf Husayni. They brought a great deal of name and fame to their profession at the time of Babar and Humayun, in the early period of the Mughal rule in India. In Delhi, Maulana Isma'íl 'Arab, who was known for his unparalleled mastery over Unani medicine, philosophy and astronomy, as well the expert knowledge of *Hadith* (prophet's traditions)

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and *tafsir* (Quranic Commentaries), had a pre-eminent place both as a physician and as a scholar of Islamic Studies. He used to teach medicine at a *Madarsah* in Delhi, founded by Humayun (1565 A.D.), where scores of students received benefits of his extraordinary discourses[28].

Muhammad b. Yusuf Harawi, the first known Unani physician of Mughal period, is stated to have come to India in 1526 along with Babar, the founder of the Mughal empire in this country. He held a place of distinction as Babar's personal physician and compiled a medical lexicon in Arabic known as *Baḥr al-jawāhir*, which has been printed many times. His other work was *Áyn al-Ḥayāt*. A manuscript copy of the latter is in the personal collection of the author of this chapter[29]. According to *Kashf al-Zunun,* he has also written a book entitled *Tarikh al-Hind*[30].

Yusuf b. Muhammad Yusuf Harawi had also come to India with his father.[31] He held a prominent place in the court of Babar and Humayun. He was the author of a dozen books on medicine, including *Riyāḍ al-Adwiyaḥ fawaid al-Akhyar, Ílaj al-Amraḍ, Aṣl al-Uṣul, Dalā il al-Bol, Dala il al-Nabḍ, Jam íal-Fawaid, Qasidah dar Hifz-I Sayhat, Risalah Mākul wa Mashrub, Sittah-I Ḍururiyah, Risalah-I Bohran, Muqtta át-i Yusuf'i*. The last eight treatises were published by Naval Kishore Press (Kanpur) in 1886, under the title *Tibb-i-Yusufi,* while *Riyad al- Adwiyah* and *Sittah-i Ḍururiyah* have been published in the margin of *Alfaz al-Adwiyah* by Gulzar Muhammadi Press (Lahore) in 1893 A.D. These works were done between 1500 and 1540.

Hakim Abul Fath Gilani was the most distinguished person among the physicians of Akbar's reign. He came to India from Gilan via Ardbil along with his two brothers Hakim Humam and Hakim Nuruddin in 1575[32]. According to the author of *Ma āthir-i Raḥimi*, his rank in the court of Akbar was much higher than that of Jáfar Barmiki in the court of Harun al-Rashid[33]. Hakim Abul Fath was a most clever, intelligent and skillful physician. He was the first commentator of *Qanunchah* in India, with the title of *Fattahi.* His book *Qayāsiyah*, which is a commentary on *Akhlāq-i Nāsiri* of Khwaja Nasiruddin Tusi, bears clear testimony to his in-depth knowledge. Collection of his tested medical prescriptions have been preserved in the Punjab University Library of Lahore. Hakim Abul Fath Gilani died in Abbotabad in 1589, and buried in Hasan Abdal.

A young Portuguese once came to Akbar's court and had brought with him tobacco and his clay pipe. The Emperor tried it but the experience made him cough. At the same time, Hakim Abul Fath Gilani, who was called, carried out a technical experiment on the new find and agreed with the foreigner that it was not harmful but delectable. However he did not favour its excessive use. He suggested that its smoke has first to go through it and then reach the mouth via a pipette. By this clever stratagem, most of its harmful ingredients would be deposited in water[34].

Hakim Hamam, (d. 1594) younger brother of Hakim Abul Fath, was also a great physician and close to Akbar. He was sent as an envoy to the court of 'Abdullah Khan Uzbek in 1583. After his death, he was buried in Hasan Abdal near his brother.

Hakim Mir Fatḥullah Shirazi, (d. 1589) was a disciple of the best Iranian teacher Khwaja Jamaluddin Mohammed and Mir Ghayathuddin Mansur Shirazi[35]. He came to Deccan at the invitation of its ruler 'Ali 'Adil Shah, and later became attached to the Court

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of Akbar in 1582-83[36]. The emperor bestowed on him the title of *'Aḍdud Dawlah*. He was a unique scholar of Unani medicine as well as of philosophy, astronomy, geometry, arithmetic and astrology, as also of traditional science like the *Quranic* commentary and Prophetic traditions. Acknowledging his scholarship and vast knowledge, Abul Faḍal writes: "If all the books of science and medicine of the world are destroyed, he is capable of writing them again and the loss of destroyed books would not be felt[37]". Fatḥullah has written *Tafsir-i Quran* and supplement to *Hāshiyah Dawwāni* in Persian and also contributed to *Tarikh-i Alfi*.

The importance of Fatḥullah Shirazi also lies in the fact that he was the main spirit in India behind the spread of rational sciences, including *Tibb*. Thus a new chapter, especially for the study of philosophy and medicine, began. Well-known scholars like Mir Taqiuddin Muhammad, Mulla 'Abdussalām Lahori and Hakim 'Ali Gilani were among his numerous pupils. Fayḍi has called Mir Taqiuddin Muhammad as the front-line scholar of Iraq and Faris[38]. 'Abdussalam Lahori made a name for being one of the most skillful teachers. Shaykh Muḥibullah Allahabadi, Shaykh Muhammad Afḍal and Mulla Ábdussalam Dewi were his pupils. The last named was the teacher of Mulla 'Abdul Ḥalim Sehalwi, who in turn was the teacher of Mulla Qutubuddin Sehalwi, and whose pupil was Mulla Nizamuddin Sehalwi, the founder of the *Nizamiyah* curriculum in Muslim religious schools in India. Abul Faḍl has recorded Akbar's sorrow on Fatḥullah's bereavement[39]. Hakim Fatḥullah was a master in mathematics, physics and several other disciplines. He was a great innovator and had invented the grinding machine (flour mill), which resembled a windmill. He also designed and manufactured a gun which could fire twelve shots in a single round[40].

Hakim 'Ali Gilani (d.1609) occupied a special position as a physician in Akbar's court, very able, reliable and highly respected. He was a nephew of Hakim al-Mulk Shamsuddin Gilani and a pupil of Amir Fatḥullah Shirazi. Emperor Jahangir acknowledged his merit in the following words: "He was a unique and incomparable physician and had perfect knowledge of Arabic sciences. He wrote a commentary on *Al-Qanun* during the days of my exalted father[41]".

One day, by order of Akbar, some bottles, containing urine samples of a sick person, a healthy person, a cow and an ass were brought to the Hakim 'Ali Gilani for examination. 'Ali correctly recognised the urine of each bottle. Akbar and the other members of the court were amazed at the expertise of Hakim 'Ali Gilani.

Rawghan-i Deodar (oil of Cadrus Deodara) was the well-tested formula of Hakim 'Ali Gilani, which he invented and which finds a place, even to this day, in the clinics of Unani physicians. It was a painkilling oil. Once Akbar fell down from an elephant and suffered from intense bodyache. Hakim 'Ali recommended *Rawghan-i Deodar,* and got it massaged on the King's body. The King was completely cured and recovered from all the aches and pain in three days. Hakim 'Ali has described several of his successful experiments with this oil.

Sharbat-i Kaifnāk (ecstatic syrup), was also a well-tested formula of 'Ali Gilani. It was a medicinal preparation in sweet wine for removing anxiety and fatigue. Jahangir used it so many times. He admitted that he drank a cup of it and liked its quality very much.

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When Akbar was attacked with severe diarrhoea, the endeavours of all the physicians proved unsuccessful. The king got angry and said to 'Ali "you are nothing but a foreign spice-seller. We raised you to this rank in order that some day it might be of use". On hearing this, 'Ali addressed: "I have got this kind of medicine also, but of what use would it be when it does not apply in the present case[42]".

Hakim 'Ali was also a master architect. A water tank of three yards deep and twenty yards square was built with a unique small room at its centre and with a high minaret on the roof. The room was accessible through four bridges, one on each of its sides. The doors of the room were left ajar but strangely enough, no water entered the room. Akbar, on hearing about that unique tank, paid a visit himself and diving under the water he swam into the room. It was tastefully furnished with beds to sleep, clothes to wear, food to eat, and books to read. It had sufficient light and was roomy enough to accommodate about twelve people. The room was airy, with no drop of water inside. Akbar was all praise to that feat of Hakim 'Ali.[43]

Shaykh Mina, son of Shaykh Hasan Mutaṭayyab Sarhindi, was an outstanding physician and surgeon of Akbar. Abul Faḍl writes in a letter to him: "The sealed medicine which you had consigned to His Imperial Majesty is an honorable present. He was pleased with it, also remembered you, took a little himself and gave a little (to this) humble servant[44]".

Needless to say the medicine, which was so very meticulously presented to the sovereign, must have also been prepared with equal, if not more, caution and care, under the direct supervision of the physician himself. We can safely infer from this that the physician's practice and pharmacology were not two separate practices in those days and the preparational aspects were not less important. It was the personal responsibility of the physician himself on which his fame depended, his expertise and his rise or fall[45].

'Ayn ul-Mulk Shirazi (d. 1594) was a member of the group of countries and nobles of Akbar. The authors of *Ma āthir al Umarā and Muntakhab al-Tawarikh* wrote: "He had a high place in medicine and ophthalmology"[46]. *'Ayn al-Mulk* was the title conferred on him on account of his skill in ophthalmology. It was given to him by emperor Akbar himself. From his mother's side his genealogy leads up to the learned scholar Dawwāani[47]. He had written a book on diseases of the eye known as *Ḍiya'al-'uyun*[48].

Hakim Muzaffar b. Muhammad Husayni Shifa'i Isfahani (d. 1627) was the personal physician of Shah Àbbas I. The famous poet Ṣa'ib wrote a verse when he came to India[49]. *Qarābādin-i Shifai* is his famous work, which is used as a reference book by physicians even today.

Many Unani physicians had come to India after hearing about the patronage of learning by Àbdur Raḥim Khan-i Khānān, the famous *Ameer* of emperor Akbar. They got attached to his court. *Ma āthir-i Raḥimi* contains a detailed account of such physicians, namely, Hakim Mashhadi, Hakim Faghfur Lahijani, Hakim Nafis Gilani, Hakim Kamaluddin, son of Hakim Ahmad Shirazi, Hakim Baqir Tabrizi, Hakim Jibra il Tabrizi. The author of *Ma āthir-i Raḥimi* says: "Iran is actually the training school of India, and Iranian scholars came here in search of knowledge only to get access to the court of *Khan-i Khānān*"[50].

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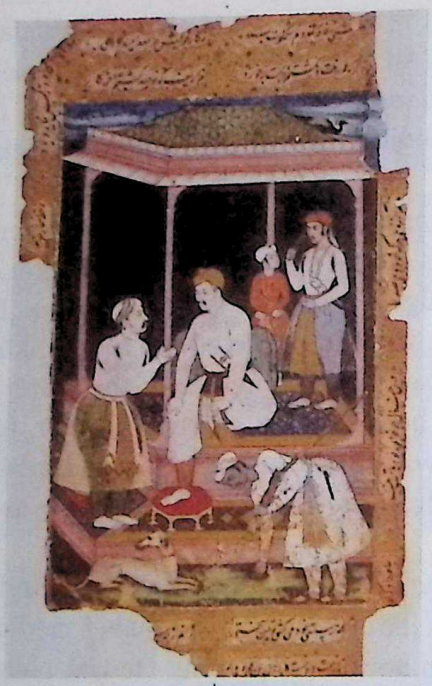
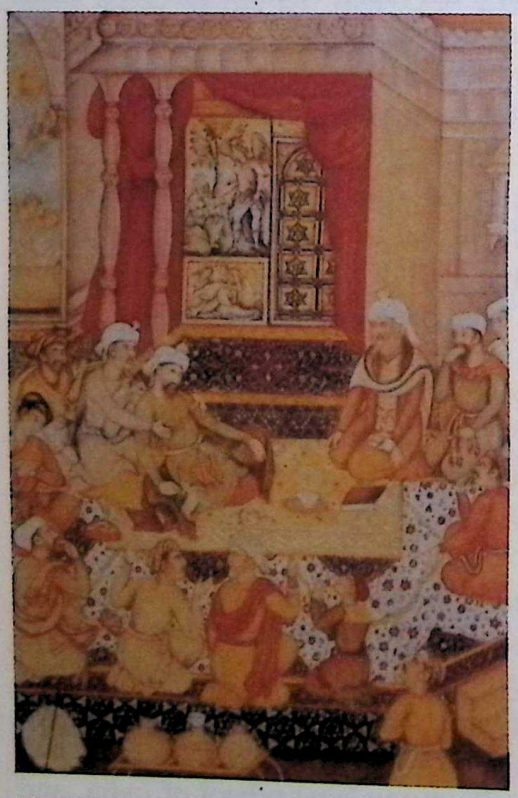
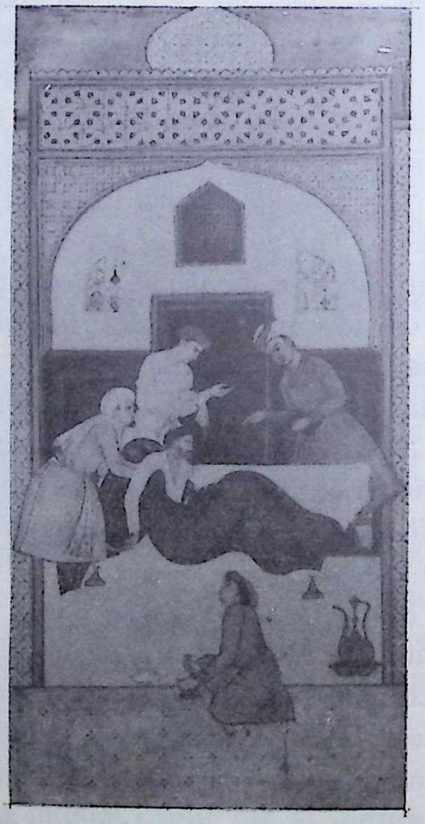


Akbar's Illness, c. 1605, Cincinnati Art Museum. (Published: S.C. Welch, *Imperial Mughal Painting*, New York, 1978, p. 69, where the figure shown standing before the emperor Akbar is described as the likeness of Hakeem Ali Gilani.)

Portrait of Hakeem Sadra, Masih uz Zaman, c. 1600-25, British Museum and Library. Add. 18801, No. 30. (Published: Percy Brown, *Indian Painting under the Mughals, A.D. 1550 to 1750*, Oxford, 1924, p. 65.)



Physicians (unidentified), c. 1595, an illustration from the *Khamsa* of Nizami, British Museum, London. Or. 12208, f. 23b. (Published: Amina Okada, *Imperial Mughal Painters*, Flammarion, p. 130, fig. 143.)



Physician and the Patient, 1602-3 A.D., an illustration from the *Diwan* of Hasan Dahlavi, Walters Art Gallery, Baltimore. (Published: Amina Okada, *Imperial Mughal Painters*, Flammarion, p. III, fig. 120.)

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Hakim Fatḥullah Gilani. The most famous physician during the reign of Jahangir was Hakim Fatḥullah Gilani, who is reported to have perfect knowledge of astronomy in addition to his skill in medicine. He completed the translation of the first book *Kulliyat* (basic principles of Unani medicine) of *Al-qanun* in Persian, in 1593. It was published by Nawal Kishore Press (Lucknow), in 1890. His descendants had also the same status and calibre in *Tibb*. His son Hakim Abul Qasim Shirazi was also a learned physician, and so was his grandson Hakim Fatḥullah, who was attached to the principality of Imam Quli-b. Allahwardi in Iran. He was well-versed in *Tibb* and other branches of learning. He became a courtier of emperor Shahjahan on arrival in India. His son was given the title of *Khan* and the rank of *Hazari*, an officer having one thousand men under his command[51].

Hakim Rukna Kāshi (c. 1656) held an important position in the court of Shah Àbbas Safawi, and came to India during the reign of emperor Akbar[52]. Subsequently, he became a courtier of emperors Jahangir and Shahjahan. Thus, he served three great Mughal emperors. Once, when Jahangir fell ill in Kashmir, Kashi went to Kashmir for Jahangir's treatment. Shahjahan had once gifted him 12000 rupees for his expertise. The author of *Ma āthir al-Umarā* has praised him as one of the famous physicians and a top-ranking poet[53]. In poetry, too, he attained a distinguished position[54].

Hakim Hadhiq (c. 1068), with Kamaluddin as his real name, the eldest son of Hakim Hamam and nephew of Hakim Abul Fath Gilani[55], was of extremely sharp intellect and a man of great wisdom. Born in the precincts of Fatehpur Sikri, he was at home in logic, medicine and poetry. He was sent on a diplomatic mission to Balkh in the royal court of Imam Quli Khan[56]; appointed as holder of the office of *'Arḍ-i Mukarrar* in place of Masihuzzaman, in 1631. He was conferred with *Seh Hazari Mansab*, getting a huge annual pension amounting to twenty thousand, which was raised later to forty thousand per annum[57]. He inherited the monetary assets, expertise in Unani medicine, as well as an aptitude for literature and other subjects from his father. He was a helping hand in compiling a history of his time with the court historians; and left a collection of verses, which he used to recite with great éclat. The manuscript of his *Diwan* is preserved in Maulana Azad Library, Aligarh Muslim University (Aligarh).

Hakim Mir M'asum (1561-1610) was born at Bakkhar (Sukkhar)on *Ramadan* in 922 A.H./1516A.D. He was, at the same time, an outstanding historian and seasoned journalist. He was also a noted poet and remarkable calligraphist. He got his couplets inscribed on the gates of mosques and other buildings on the route from India to Tabriz and Isfahan (Iran). He was also a good architect and had many beautiful buildings erected at various places[58]. His book *Mufridat-i M'a sumiya* is an important work on materia medica, and his other book is *Tibb-i Nāmi*.

Muqarrab Khan Shaykh Hassu (1556-1646), son of Shaykh Mina, a famous physician and surgeon at the time of Akbar and Jahangir. He practised in medicine and surgery along with his father and exhibited his achievements in these branches of treatment. Like his father, he had no rival in surgery. While deer-hunting (1595), a sensitive limb of Akbar's body was accidentally injured by the horn of an antelope. The limb was so swollen that the King could not even go to the toilet for seven days. This caused concern to the people. While Hakim Ḥassu and Hakim 'Ali were in charge of the treatment, Shaykh Mina and Muqarrab Khan applied medicine and dressing to the wound. Both

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father and the son performed feats of surgery in this complicated case. He passed away at the ripe old age of 90 years. The profession of surgery continued in his family[59].

His nephew Shaykh Qasim, son of 'Abdur Rahim, was the disciple of grandfather Shaykh Mina, in surgery—his ancestral profession. He was an efficient surgeon and noted mathematician. He had knowledge of other subjects as well. In surgery, he was as adept as his uncle or other members of his family.

In 1660, Jahangir, on the advice of Hakim Momina, got arteriotomy performed on him. Hakim Muqarrab Khan was famous for his expertise in such jobs, since his knife never faltered. But that time it did falter, and twice in a single operation. Eventually, Qasim performed it. Jahangir bestowed a *Khil'at* on him and awarded a cash price of 2000 rupees[60].

Hakim Ṣadruddin Ṣadra (d. 1607) was the son of Hakim Fakhruddin Shirazi and pupil of Hakim Baqar. He also benefited from the teaching of Hakim 'Ali Gilani after his arrival in India[61]. Emperor Jahangir bestowed on him the title of *Masihuz Zaman*[62]. Shahjahan had allocated an annual stipend of fifty thousand rupees for him[63].

Sadra was also an eminent expert in the field of philosophy. In his *Tuzuk,* Jahangir has recorded his liking for him. In his declining age, Ṣadra spent his summer in Kashmir and winter in Lahore[64].

Hakim Momina Shirazi rose to fame during the reign of Emperor Jahangir who bestowed on him the rank of Officer "having one thousand men under his command" for his medical service[65]. He was given an annual stipend of thirty thousand rupees by Shahjahan[66]. He also rendered medical services to Emperor Aurangzeb 'Alamgir[67].

Hakim al-Mulk Abul Qasim Gilani, son of Hakim-ul Mulk Shamsuddin Gilani, was held in high esteem during the reign of both Jahangir and Shahjahan. He was given the rank of officer "having two thousand men under his command". He was permitted to go to *Hajj* for a pilgrimage in 1638[78].

Hakim Nuruddin Muhammad b. 'Abdullah was the grandson of the famous physician 'Ayn Al-Mulk Shirazi and nephew of Abul Faḍl and Fayḍi. A descendent of a distinguished family of scholars, he was born at Agra. He was not only a prominent physician during the period of Shahjahan and Dara Shikoh, but deserves to be called the leading physician of the 17th century. He achieved great eminence amongst contemporary physicians. Besides being associated with the art of healing, he was well-versed in literature, poetry, metaphysics and Sufism; authored about nine books, viz., *Anis al Mu'alijin; Alfaz ul-Adwiya,* (written in 1628), *'Ilājāt-i Darashikohi* (1050 A.H/1640 A.D.); *Asbab-i Sitta-i Rashidiyah, Qisṭāsul Aṭibba* (written in 1640); *Marātibul Wajud, Waqi'at Abul Faḍl, Latifah-i Fayḍi, Insha-i 'Ayar-i Dānish.*

The first two books of the above list have been printed many times in India. He wrote *Alfaz al-Adwiyah* for Shahjahan and *'Ilājāt-i Dārā Shikohi* for Shahjahan's son Dara Shikoh. The latter is a most voluminous book, which has 1711 folios; one of its manuscripts is available in Bibliotheque Nationale, (Paris), and another in Nizamia Tibbi College, Hyderabad[69].

Hakim Fatḥ ullah (d. 1653) b. Hakim Abul Qasim Shirazi, was born in Shiraz (Iran), where he had received his instructions, was associated as a disciple of Imam Quli b. Allah Wardi Khan, and came to India after the demise of his mentor during the emperorship of

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Shahjahan, who adopted him as one of his court physicians[70]. He was adept at the fundamentals of *Tibb* and an expert in the treatment of complex diseases; and was acclaimed as second to none in the diagnosis of diseases, dosages and formulations. Being in the charmed circle of the emperor, he was granted the rank of nine hundred in 1645[71]. Following his demise in 1653, his son Muhammad Ṣāliḥ, also a skilled physician, was offered the same status and a title—*Ṣāliḥ Khani*—by the Emperor. When Emperor Aurangzeb was sojourning in *Bagh-i Naw Manzil* at Agra after having defeated Shuj'a at Kathua, he was gifted a decorated dagger, and offered a pachyderm on the occasion of *Jashn-i Julus*. He died in 1674.

Sati al-Nisā Khānam, (c. 1646) was sister of poet-laureate *Malik-al-Shu'ara* Talib Amuli (1035A.H./1625A.D) and spouse of Hakim Nasira Kashi, and sister-in-law of Hakim Rukna Kashi[72]. She had great insight in both *Tibb* and management of diseases, especially those that were complicated ones. According to *Shahjahan Namah*, she was very skillful in treating complicated diseases[73]. She displayed rare skills in Persian poetry and literature, *Qirat* and euphony, household affairs and socializing, besides being an acclaimed practitioner of Unani medicine.

She was deputed to take care of Princess Jahan Ara, the daughter of Emperor Shahjahan. She also served as the tutoress of the princess[74]. This lady was also associated as a special physician with Begum Mumtaz Mahal, the royal consort; and was appointed after the demise of the begum, the chief in charge of the *Ḥarem*. She passed away on *Dhil hijj*, 1056 A.H./1646 A.D., in Lahore. The expenditure of her funeral was borne by the Emperor himself, who kept her remains preserved first for one year, and later buried in Agra on the western side of Taj Mahal, erected in the memory of his departed Queen. Her dome was constructed at a cost of Rs.30,000. For the maintenance of the mausoleum of the departed lady physician, the emperor ordained a village trust which in those times accrued Rs.3,000 annually from its revenue[75]. She left no progeny, but adopted two daughters of his brother. The elder one was married off to 'Aqil and the younger to Hakim Zainuddin.

Hakim Amanullah Khan Husaini: During Shahjahan's reign, Unani physicians were posted at different places besides Delhi, the capital. Hakim Mir Muhammad Hashim was the superintendent of Royal Hospital at Ahmedabad, Gujarat. Hakim Masihuz Zaman was posted at Surat. In Delhi, in the vicinity of the Jama Masjid, Shahjahan had set up a big hospital and its staff included competent physicians. The hospital offered treatment free of charge. Hakim Muhammad Daud, Hakim Momina, Hakim Taqarrub Khan, Hakim Amanullah Khan and Hakim Nuruddin Muhammad had acquired great fame. However, Hakim Amanullah Khan and Hakim Nuruddin Muhammad surpassed all of them.

Hakim Amanullah Khan (d. 1636) was the son of Jahangir's and later Shahjahan's valorous commander, Mahabat Khan. He was the author of *Dastur al-atibba*,[76] *Umm al 'Ilāj*, (1036A.H./1627A.D) *Ganj-i Badaward*, and *Sahib Qirā ni*, though a manuscript, has given an eternal fame to its author, who has in this monumental and voluminous work brought together the tested prescriptions and practices of all the well-known Unani physicians, right from the inception of the system down to his own age. The author has also noted his own observations on a number of prescriptions or formulations[77]. He was conferred *Panj Hazari Mansab* and the title of *Khan Zaman Firoz Jang* by Shahjahan.

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Hakim Nizamuddin Ahmad Gilani (d. 1659) was the pupil of Mir Baqar Dāmād and Shaykh Bahauddin Muhammad Ámuli. He was attached to the court of Qutub Shahi, ruler of Deccan in India, who bestowed on him the title of *Hakim al-Mulk*. He was the author of about a dozen books.

Hakim Syed Muhummad Hashim Tehrani (d.1650) b. Mir Qasim Ḥusayni Gilani wrote an annotation on *Sharh Asbāb wa 'Alāmāt*. Apart from this note, he also wrote annotations on *Sharh Hidāyat al-Hikmat-i Maybdhi, and Uqlidas* (Euclid). There was no limit to his knowledge and scholarship, so much so that he prepared annotations on the famous commentary of the holy *Quran*, known by the name of *Tafsir-i Bayḍavi*.

Hakim Dāud Taqarrub Khan (d. 1662) was the son of Hakim 'Inayatullah Khan, who was a disciple of Ṣadra's father Hakim Fakhruddin Muhammad Shirazi[78]. Following the demise of his father, the able son, by dint of his accomplishments in Unani medicine, achieved great heights, first as the Chief Physician to Shah Ábbas and later in the same capacity to Shah Safi. He came to India during the reign of Shahjahan in 1643 and was granted an audience with the Emperor at Akbarabad. He accepted the royal service, ranks and cash awards to the tune of Rs 20,000[79]. Just a score of days prior to joining his job at the royal court, the beloved princess named Begum Sahib was badly scalded on her back, ribcage and both the arms. Besides, the princess was afflicted with fever, diarrhoea, palmar, pedal and palpebral oedema. He got at once at the root of her ailments and prescribed appropriate medicines. Later, when the princess had completely recovered, Hakim Dāud was granted by the Emperor the rank of two thousand pachyderm, one horse adorned with accessories as well as robes (*Khil'at*)[80]. The author of *Badshah Namah* says: "Clothes of the wife of Shahjahan caught fire, and she was badly burnt and remained in bed for four months. Successful treatment was given to her by Hakim Dāud".

In the 31st year of Shahjahan's era, the Emperor contracted incontinence of urine, which when treated with cold medicaments turned into the disorder of constipation and polyuria. While other famous court physicians drew a blank, only he came to the Emperor. The rank of five thousand was then granted to this royal physician after this successful treatment[81].

Lahori, at another place, writes in honour of this celebrated physician as follows: "His immense skill and outstanding experience in the art of medicine, won for him high status and a rank of 1500 horse man[82]. During the house arrest of the Emperor Shahjahan, he was appointed by Emperor Aurangzeb as his own physician. He was granted 30,000 gold coins (*asharfi*). Later, on account of something he got a punishment from 'Alamgir[83]. He is reported to have experimented with certain plants to increase the height of trees by peculiar use of ice-cold water filled around their roots[84, 85].

The Sharifi Family of Physicians

The Sharifi family is known for the large number of *Tabibs* it produced. It included such eminent persons as Hakim Muhammad Sharif Khan, the progenitor of the Sharifi family of physicians. This family enriched Unani medicine through their teaching, practice, vast experience and many books, which they wrote on different medical subjects. They have

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left for the coming generations, a valuable legacy in the form of teaching institutions, books, tested, prescriptions and formulae. They made medicine a viable instrument of service to the people, rich and poor alike.

The two brothers Hakim Faḍil Khan and Hakim Ajmal Khan I, who were the first physicians in this family, had earned for themselves great fame as accomplished physicians. They inculcated the study and practice of medicine in their family, which produced, besides many others, the following eminent physicians: at Agra Hakim Faḍil Khan and Hakim Ajmal Khan I; at Delhi Hakim Waṣil Khan I, Hakim Baqa Khan, son of Hakim Ajmal Khan I, Hakim Akmal Khan, Hakim Ajmal Khan II, Hakim Waṣil Khan III, Hakim Áhmad Sa'id Khan, Hakim Muhammad Ahmad Khan; at Gwalior Hakim Muhammad Laqa Khan, Hakim Warith Áli Khan, Hakim Ḥamzah 'Ali Khan, Hakim Barkat 'Ali Khan, Hakim Ahmad 'Ali Khan, Hakim Amirullah Khan; at Jaipur Hakim Waṣil Khan II, Hakim Salim Khan, Hakim Ahmaduddin Khan, Hakim Salimuddin Khan; at Patiala Hakim Sharifuddin Khan, Hakim Ghulam Muhammad Khan, Hakim Ghulam Murtaḍa Khan; at Tonk Hakim Muhammad Muzaffar Husayn Khan, Hakim Fida Ahmad Khan, Hakim Mehdi Ahmad Khan.

Hakim Ajmal Khan I and Hakim Faḍil Kahn I, were the sons of Khwaja Mulla 'Ali Dāud. They were the first in the family to turn their attention to Unani medicine. They acquired theoretical and practical knowledge of medicine and were soon recognized as competent physicians. They had access to the Royal *Darbar* at Agra. Shahjahan appointed them as Royal Physicians, and conferred on them the title of *Khan*. Their descendants left Agra for Delhi and received royal patronage. He left one son, Hakim Khwaja Baqa Khan. Hakim Laqa Khan, the grandson of Hakim Baqa Khan, had shifted to Gwalior at the invitation of the Maharaja, who appointed him as his personal physician and granted him a *Jagir* in 1785[86].

Hakim al-Mulk Mir Mehdi Ardistani arrived in India during the reign of Aurangzeb 'Alamgir, who bestowed on him the title of *Hakim al-Mulk* in 1663[87]. Mehdi Ardistani and Hakim Muhammad Amin Shirazi were special physicians of Álamgir. He was conferred the *Char Hazari Mansab*[88]. His famous work is known as *Minhat al Shifa'*.

Hakim M'asum b. Karimuddin Shirazi (d.1691 A.D.) came to India after completion of his education in Shiraz and become attached to the court of Prince Muhammad 'Azam Shah. He wrote the well-known book *Qarabadin M'asumi* in 1050A.H./1640A.D. (One copy of this manuscript is preserved in the collection of the author of this chapter). It is considered to be one of the most reliable books on the pharmacopoeia of Unani medicine[89].

Nawab Khayar Andish Khan's (d.1710) real name was Muhammad Khan; the title *Khayar Andish* was conferred by the Emperor, by which he was known as such. Belonging to Meerut and son of Nawab Muhabbat Khan, he was serene, mature, and was used to spending a lot for the needy. His predecessors and successors shared his common trait. He acquired an early mastery over the texts, and achieved excellence and ease in writing. He became quite close to Dara Shikoh, but after whose assassination Aurangzeb took him under his care. Conferred with a rank of five thousand as also the title Khayar Andish, he was appointed Commander-in-Chief of Etawah. He reached upto the rank of six thousand by Emperor Bahadur Shah. Aurangzeb was highly satisfied with his work, which is evident from an epistle he wrote to *'Umdat al Mulk* Asad Khan *Madār al-Mahām* (prime

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minister).[90] Khayr Andish Khan was both a disciplined man of war and a statesman, also an able physician; he founded a hospital at Etawah, where he authored a work entitled *Kyayr al-Tajārib.* (1637 A.D.) He flourished through the reigns of three emperors; he passed away in 1710 A.D. on the day of *'Id al-Fitr* at the ripe old age of 120 years, as recorded in *Kitab al-Mashahir.* His son Muhammad Faḍil Khan was conferred with the title of *Naik Andish Khan* by Aurangzeb[91].

Shaykh Ahmad Kannawji was a learned man of India of his times. He held a high position among the teachers of Aurangzeb. Beside medicine, he was an eloquent poet. He composed *Tuhfat al-Atibba,* versified commentary of *Qanunchah* in 24000 couplets. These indicate his medical skill and poetic expertise. It was composed in 1716, and its manuscript was scribed by Lachman Narayan on 29th Dhil Hajj 1219 A.H./1850 A.D., and bears the seals of the rulers of Awadh, Amjad Ali Shah and Wajid Ali Shah.

Hakim Muhammad Waṣil Khan I (d.1732) was the son of Hakim Faḍil Khan. He came to Delhi from Agra during the reign of Aurangzeb and got an employment as a physician in the Royal Court. He was very pious and discharged his duties honestly. He became a disciple of the great saint Shaykh Kalimullah Jahanabadi. He was a voracious reader, and built up a good collection of literature of Unani medicine. Besides Unani, he could converse with many other subjects, especially mathematics. In one *bayāḍ,* he collected tested prescriptions of ancient physicians and in another his own[92, 93].

'Abid Sarhindi (d.1739) was a distinguished teacher, author and successful medical practitioner in the reign of Muhammad Shah. He was the teacher of Hakim Sharif Khan of Delhi. He wrote an excellent book for Emperor Muhammad Shah (reign 1719-48 A.D.). Raza Library (Rampur) has a copy which was scribed in 1160 A.H./1747 A.D., i.e., nine years after the death of the commentator[94, 95].

Nā iti Family

In the 8th century A.D., the Nā iti migrated to India and settled in the coastal area of Konkan, and soon they flourished there. The migrants were related to the Nā iti community, and hence they are known as Nā iti. They had been prominent in the field of education. Having come to India, they maintained their traditions and produced great scholars. This family showed eminence in the art of medicine, and rendered great medical services in South India.

Hakim Shah Zayn al-'Abidin Nā iti was the first physician of this family. His father's name was Ghulam Muhammad Khan, and was addressed as Raḍa Husayn Khan. His ancenstral native place was Delhi. During the period of Nawab Sádatullah Khan, the Nā iti Governor of Karnataka, he came to Arcot and settled in Muhammadpur. After the death of Sádatullah Khan (11731), he settled in Madras. It was during this period that Hakim Zayn al-Ábidin achieved fame.

Hakim Zayn al-'Abidin, besides being a physician, was considered an authority on *Hadith,* and he had also sound knowledge in astronomy, arithmetic and geometry. He left behind a number of books as commemoratives[96].

M'u tamad al-Mulk Hakim 'Alwi Khan Shirazi (d.1749) was the most famous physician during the reign of Emperor Aurangzeb 'Alamgir. His name was Muhammad Hashim but

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he was popularly known by the name of Álwi Khan. His father was Hadi and grandfather was Muzaffar Husayn 'Alwi. He is well-known to every student of Unani medicine. He learnt the healing-art in Shiraz, and came to India in 1111 A.H./1700 A.D. He got attached to the court of Aurangzeb. He was given the title of Mútamad al-Mulk and the rank of officer having six thousand men under his command by Emperor M'uhammad Shah. 'Alwi Khan demonstrated such skill in treatments that Muhammad Shah weighed him once against gold and silver, granted an award of Rs. 8000, and fixed a monthly salary of Rs. 3000. Despite such closeness to and favours of the Emperor, 'Alwi Khan never neglected the treatment of common people. His services to the common man continued without break. Thousands of patients would come to him for treatment, and even amidst his long hours of work as a physician, he continued writing books. He was laid to rest in the compound of Nizamuddin *Auliya*.[97]

There is no denying the fact that Hakim 'Alwi Khan is the most distinguished personality in the history of Unani Medicine in India. He has left a very deep impression in all the fields namely, teaching, writing and treatment. Hundreds of students have benefited from his teaching. In a way, he is the founder of a medical school, whose members were known as Atibbā-i 'Alwi Khani. 'Alwi Khan wielded great influence in India befor the Sharifi and 'Azizi families of Unani physicians[98]. He is the author of more than a dozen books, including *Hāshiyah-i Sharh-i Asbāb wa Alāmāt, Hāshiyah-i Mujiz al-Qanun, Ja'i al-Jawami, Ahwal-i Áḍa al-Nafas, Risalah Qawanin al-'Ilaj, Risalah Amraḍ-i Atfal, Tadhkirah al-'Ilaj, Risalah Dastur-i-ílaj.* He has also left behind a collection of his tested prescriptions, which were published by Nawal Kishore Press (Lucknow), in 1910, under the title *Matab-i 'Alwi.* Copies of diaries of his clinical practice are extant in various libraries of India. Of the several students of Álwi Khan, many students acquired fame. The most distinguished were Hakim Sayyed Nurullah, author of *Anwar al-'Ilaj,* and Hakim Thanaullāh of Bareilly, who was the teacher of Hakim Shahbaz Khan[99].

The Baqāi Family

This family played a very important role in promoting the cause of Unani medicine in India. The first physician of this family was Hakim Masiha Khan, who belonged to Laar, a famous city of Iran, and attached to the court of Shah 'Abbas Safawi and held the prestigious post of *Hakim-i-Bashi*. His son Hakim Arshad Khan came to India, and was attached to the court of Emperor Aurangzeb.

Hakim Baqa Khan (d.1743) b. Hakim 'Abdus Salam Khan b. Hakim Habibullah Khan b. Hakim Dost Muhammad Khan b. Hakim Shah Muhammad Khan b. Hakim Arshad Khan, was an eminent personality of Baqai family of Hakims, and a good practitioner of Unani medicine in Delhi. His son Hakim Muhammad Isma'íl Khan compiled his tested formulations with the title: *Qarābādin-i Baqa-i* in two volumes (1078 pages), printed in 1861 and 1862, respectively, in Hindu Press (Delhi).

Hakim Ishaq Khan, grandson of Hakim Baqa Khan, was a personal physician of Mughal Emperor Shah 'Alam. The king had conferred on him the *Panj Hazari Mansab* and the title of *Mútamad al-Mulk in 1758*. He was the author of *Ghāyat al-Fahum fi Tadbir al-Ḥumum* (1769), *Mawārid al-Ḥakam* and *Jawamí ál-Kalim*. The Baqa-i family is still living

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in Delhi. Gali Hakim Baqai, a by-lane of Delhi, is named after him. This family is noted for the treatment of ailments of the eye. Some members of this family migrated to Pakistan after partition. They are also prominent practitioners of Unani medicine there[100].

Hakim Dhakaullah Khan, Imamuddin Khan, Asad Ali Khan, Yusuf Husayn Khan, Shuj'at Áli Khan, Husamuddin Khan, Qayamuddin Khan, Latif Husaiyn Khan, Muniruddin, and Mukarramuddin were the learned members of this family.

Hakim 'Ajaib b. Muálij Khan b. Asghar Khan b. Nawab Muqarrab Khan was a distinguished physician of 18th century. His father was very famous, and he was a pupil of 'Alwi Khan. Hakim 'Ajaib Khan (d.1140 A.H./1727 A.D.) has written an excellent annotation on *Nafisi* which is extant in Raza Library Rampur and Khuda Bakhsh Library, Patna, the manuscript of which scribed in 1853.

Hakim Mir Muhammad Husayn Shirazi (d.1790), son of Hakim Muhammad Hadi 'Aqili, was the most important and the last link of this illustrious family chain. He is particularly famous for his highly informative and voluminous works *Makhzan al Adwiyah* on simple drugs (1769), *Majm'a al-jawamí* on Unani pharmacopoeia (1771) and *Khulāsat al-Ḥikmat* on basic principles of *Tibb* (1781). These books have been printed in India many times and are considered as reliable works on Unani in the Indian sub-continent[101].

Hakim Husayn Shirazi went to England in 1775 along with Mr.Eliot for higher studies, where he studied several subjects, particularly astronomy of celestial bodies, as well as compound and single medicines. He conducted research on the properties of several drugs, and anatomy. He also translated some books on the subjects he studied in English into Persian[102].

Hakim Akmal Khan (d.1787) was the son of Waṣil Khan I. After the death of his father, King Muhammad Shah allowed him to live in the Red Fort of Delhi, where he treated the members of the royal family. The King conferred on him the title *Hadhiq al-Mulk,* and gave a *Jagir* in Bihar. After the death of Muhammad Shah his successor, Ahmad Shah, was not in good terms with Hakim Akmal Khan. Fearing dire consequences, he shifted his library to a safer place, but his *Jagir* and other properties were confiscated. He spent his time in prayers and in the service of his patients[103, 104].

Hakim Ajmal Khan II, the second son of Hakim Muhammad Wasil Khan I, completed his education of Unani medicine under the guidance of his father, and started his independent practice. He was an expert in the diagnosis of complicated diseases as well as writing prescriptions.

He has left behind two *Tibbi Bayaḍes* (notebooks) that consist of his own tested formulae as well as those of his predecessors. He had three sons and three daughters. The sons were Hakim 'Adil Khan, Hakim Mehdi Khan and Hakim 'Aqil Khan. All the three practised Unani in Delhi. Later, Hakim Mehdi Khan migrated to Tonk, and descendants of Hakim 'Adil Khan to Jaipur. As regards his daughters, the eldest was married to Hakim Mehdi Khan, son of Hakim Ahmad Khan, the second to Hakim Sharif Khan, and the third to Hakim Laqa Khan[105].

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Hakim Akbar Arzani was, undoubtedly, a prominent personality of his time. His great achievement was to translate the medical treasure from Arabic into Persian and to make it accessible to those who knew only Persian. This achievement ensured the success of Unani in Mughal India. His books served as popular texts for medical students, as also the guides to physicians and scholars. Further, he made his healing art and its benefits inexpensive for his fellow men. One of his most important works is *Tibb-i Akbar*, completed by him in 1797 A.D. It was translated into Urdu and Hindi as well. Arzani went on producing work after work of high merit till the time of Farrukh Siyar during the earlier part of whose reign he wrote one more authoritative book, *Mufarrih al-Qulub,* which is an exposition of the well-known Arabic classic, *Qanunchah*. Some other books of Arzani are *Mizan al-Tibb, Qarabadin Qadri, Risalah-i Musiqi, Mujarrabat-i Akbari, Hudud al-'Arad,* etc.[106].

Hakim Iskandar Yunani, son of Hakim Ismaíl, was an eminent physician of South India during the rule of Nawab Siraj al Dawlah of Arcot (c.1788). He commented on the Syrian and Latin medical terms which had been in use from the Middle Ages up to his time in the West. More importantly, he introduced Unani medicine in South India. As a result of the interest of Hyder 'Ali and Tipu Sultan in the field of art and education, many current books were translated into Persian, and in this way South India became familiar with the medical books of the 'Arabs[107].

Hakim Yunai also wrote the following books: *Qanuni-i 'Ahd-i Iskandari*, on basic principles of medicine. *Qarabadin-i Iskandari* on compound drugs, *Mufradat-i Iskandari* on simple drugs. The manuscripts of these works are available in the Government Oriental Library (Hyderabad).

Hakim Muhammad Sharif Khan (1725-1807), son of Hakim Ajmal Khan, was the most dignified member of the Sharifi family of Delhi, on account of his professional skill, medical expertise, valuable works and a large circle of people. He is the best-known medical man in India after Hakim 'Alawi Khan. The Sharifi family, now familiar, is known after him. He was the son of Hakim Akmal Khan.

After completion of his general education, he began learning medicine from his father and uncle[108]. He was well-known for his sharp wit, quick grasp and remarkable memory. After completing the theoretical Unani education, he was inducted by his father into his own clinic, where he examined the patients and wrote his prescriptions. This practical approach enabled the young Hakim to learn the methods of diagnosis as well as the modes of treatment. After a few years of training, he was allowed by his father to start his independent clinic, which soon became a mini-school. Hakim Sharif Khan admitted a large number of eager students, who loved them. Though the work at the clinic was extremely tiresome, he did not mind spending a few hours each evening teaching them Unani texts. He managed to devote an hour or so each evening to go through the books he had already studied to refresh his knowledge. He had deep insight into *Al-Qanun* of Ibn Sina and related works. He wrote five important books on this subjects, namely, *Tarjumah-i Kuliyat-i Qanun* (Persian), *Tarjumah-i Humyat-i Qanun* (Persian), *Hashiyah Qanun* (Arabic), *Sharh Mujiz* and *Hashiyah Nafisi* by the name of *Madarik al-Hikam*

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(Arabic). His other works are *Fawa id-i Sharifiya, Talif-i Sharifi, 'Ilaj al-Amraḍ, 'Ujala-i Nafi'a, Risalah Khwas al-Jawahar*, and *Dastur al-Fasd.*

A voluminous work (560 pages) *Ḥashiyah Sharh Asbab* is also known by the name of *Fawa id-i Sharifiya*; its manuscript copy can be seen in the A.K. T-ibiya College Library, Aligarh Muslim University, Raza Library, Rampur, Khuda Bakhsh Oriental Public Library, Patna, and the personal collection of the author of this chapter.

Hakim Sadiq 'Ali Khan (1771-1848) the son of Hakim Sharif Khan, was also a learned medical practitioner, teacher and author. He wrote a commentary on the part of the *Qanunchah*, concerning treatment, of only chest and lungs diseases. A manuscript of this work is available in Jamia Hamdard, New Delhi[109]. The Mughal King conferred on him the title *Ashraf al-Hukama.* He was buried to the south of the Mosque near the Shrine of Bakhtiyar Kaki Delhi. His sons, Hakim Muhammad Ashraf Khan, Hakim Sharfuddin Khan, Hakim Imam Bakhsh Khan, Hakim Hasan Bakhsh Khan, Hakim Sadiq 'Ali Khan, Hakim Husayan Bakhsh Khan all followed practising Unani medicine[110].

Hakim Arshad Shifai Khan (1841) b Hakim 'Abd al-shafi Khan of Delhi, famous physician of Awadh, shifted from Delhi to Faizabad and attached to Nawab Shuja 'ud-Dowlah and Nawab Asaf 'ud-Dowlah. He was a very able teacher and practitioner. He wrote many books on Unani: *Fawaid-i shifai, Shifa al-Jamil* and *Jarahat al- Mu'anidhin*. He is also known as the commentator of Asbab wa *'Alamat* of *Najibuddin Samarqandi.*[111]

Hakim Raḍiuddin, son of Hakim Qiwamuddin (d.1818), was an expert Tabib, who was born in Amroha and was honoured with the rank of *Panj Sadi* by Emperor Ahmad Shah. He was also attached to the court of Nawab Asaf ud-Dowlah in Lucknow[112]. He wrote an excellent annotation of *Nafisi*, named Awraq al-Raḍi, which confirms his professional ability and merit. His other works were *Al-Raḍiya Hashiyah Sharah-i Asbab,* Jam'iur Raḍi (*Muálijat*) and *Al-Risalat al Jimáiyah.* His son Hakim Firoz 'Ali Khan was a noted physician and was honoured with *Panj Sadi Mansab* by Shah 'Alam. His grandson Hakim Niaz Áli Khan, too, was a successful physician and writer[113].

Hakim Sharf al-Din 'Ali Khan Nā iti (d.1825) was a famous physician of Karnataka. He spent his last days at Adhoni, and became an employee of Nawab Shuja 'al-Mulk Bahadur of Adhoni. The Nawab gave him the title of *Khani*[114].

Hakim Safiuddin Muhammad Khan Bahadur Nā iti (d.1825) was the son of Qadir 'Ali Khan Bahadur, and known as Nasir. He was married to the daughter of Nawab Sharf al-Mulk, and he was employed at his court. He was a very competent physician, a man of good conduct, and eloquent speaker known for his wit. He spent his last days at Hyderabad and settled there. He treated Nawab Ghufran in his princedom[115].

Hakim Raza 'Ali b.Mahmud 'Ali belonged to an important family of Hakims of Hyderabad. He flourished during the reign of Asif Jah III (1803-1828). His book, *Yadgar-i Rada i,* is a very important published work on simple drugs of Indian origin; its other title being *Mufradat-i Hindi*, which indicates the speciality of the work. It provides good material on the contributions of Unani physicians in India, on indigenous drugs.

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Hakim Saifatullah Na iti (d.1849) whose actual name was Hakim Muhammad 'Inayatullah, a holy person of enlightened mind, and used to call himself 'Atiq. The ruler of Karnataka, Nawab Muhammad Ghauth Khan in Tadhkira-i Ázam, has stated that throughout his life he never accepted any fee from anybody for his treatment. He was employed in the court of his majesty Muhammad 'Ali, but the court atmosphere was not suited to his temperament. A celebrated writer in Arabic, he used to compose poems, both in Arabic and Persian. A short description of his life is given in *Isharat Binash*. He died in 1266 A.H/1849 A.D.[116].

Hakim Ázizuddin, who, due to his etiquette and capability, not only gained favours in the court of Maharaja Ranjit Singh, but also made himself worthy of the honour and respect among the functionaries and officers of the British rulers, was the son of a reputed and intelligent physician, Ghulam Muhiuddin. The chief physician in Lahore, who was also the teacher of Hakim 'Azizuddin, got him a place among the physicians of Maharaja Ranjit Singh. The Maharaja was suffering from an eye ailment, 'Azizuddin, although quite young, carefully treated his eyes. The Maharaja was so pleased with him for his treatment that he granted him a number of villages as reward and appointed him as a special physician. He was sent as an ambassador to Lord Bentinck in 1831 and to the ruler, Muhammad Khan in 1835 A.D.

In 1834, Ranjit Singh had the first paralytic attack. An English doctor, McGregor, rendered treatment to him. It was then an incurable disease; besides, the Maharaja was a heavy drinker, and even electric shocks were no avail. In 1838, he had the second attack of paralysis. 'Azizuddin, as a special physician to the Maharaja, was then appointed for treatment. He provided careful treatment and prepared medicines himself, besides advising the Maharaja on the affairs of the dominion[117].

Hakim Imamuddin Khan enjoyed a unique place in medicine and philosophy during his time, before 1857. In Delhi, he earned the approbation of Sir Syed Ahmad Khan[118]. He was an expert in making a diagnosis by pulse reading. He was attached to the royal court of Akbar Shah II[119]. He was the son of Hakim Ghulam Reḍa Khan and nephew of Hakim Dhakaullah Khan. He studied philosophy from Maulana Faḍl Imam Khairabadi (d.5, *Ziq'adah*/1828), and medicine from his learned uncle Hakim Dhzakaullah Khan. He left Delhi in disgust when in his place Hakim Ahsanullah Khan was appointed as royal physician by Akbar Shah II[120]. During the reign of Bahadur Shah Zafar—the last Mughal Emperor—he was a personal physician of Nawab Zeenat Mahal, and a good friend of Mirza Ghalib. He spent some of his time in Farrukhabad at the invitation of the Nawab. In 1857, he was expelled by the British Government from Delhi, and thereafter he went to Banaras. In 1858, the Nawab of Tonk invited him to his state, and he remained there till his last breath. A copy of his tested prescriptions is extant in the State Central Library, Hyderabad. His sons Hakim Fadl Husayn Khan and Hakim Ghulam Hayder Khan, the able and experienced physicians[121], were also attached to the Nawab of Tonk.

Hakim Ghulam Ahmad Na iti, son of Muhiuddin Khan, bore the title of *Muhtamim al-Dawlah Sarbarah Khan Muhtamim Jang*. His forefather's name was 'Abdullah Khan Firoz Jang Bahadur, who was at the court of Aurangzeb Álamgir. During the period of Nawab

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Ghauth Khan, the ruler of Madras, Hakim Ghulam Khan was conferred with the title *Masih al-Dawlah Hikmat Amoz Khan, Masih Yar Jang Bahadur*, in 1853, for his competence in treating diseases. In his last days, he went to Hyderabad. Nawab Salar Jang 'Azam wished to make him in-charge of the Royal Institute of Medicine. But the climate did not suit him, and he returned to Madras, where he died. His villa in Nialpur (Madras) is well known[122].

Hakim Sadiq 'Ali Khan (1771-1848) was born in Delhi and after his death, buried in the Dargah of Hasan Rasul Numa, New Delhi. He was the third son of Hakim Sharif Khan. After completing his general education, he learnt medicine from his father and began to assist him in his daily clinical work. He read letters addressed to his father by patients from outside Delhi and wrote prescriptions. He made an extensive use of the rich Library of his father. After the death of his father, when he was 38 years old, he carefully treated patients and assumed the responsibility of teaching students[123]. He wrote a few books on Unani medicine: *Zād-i Gharib,* also known as *Makhazin al-Tálim-i Tiflan, Risalah Khwas-i Advia wa Aghdhia, Sharah Mu'alijat-i Qanuncha* (incomplete), *Sharh Tashirh Áḍa I Murakkabah* (Incomplete; written in 1861)[124]. Sir Syed Ahmad Khan, who held him in high esteem, wrote that he was an expert physician and learned teacher of his time. He treated thousands of patients and produced hundreds of students of Unani medicine[124]. He had three sons: Hakim Ghulam Muhammad Khan, Hakim Ghulam Mahmud Khan, Hakim Ghulam Murtaḍa Khan. The first and the third migrated to Patiala State and settled there, but Hakim Mahmud Khan remained in Delhi. After the death of Hakim Sadiq Áli Khan, the pension and other estates, which were granted to his predecessor and part of which he had inherited, were forfeited by the East India Company[126].

The Lucknow School

On the decline of the Mughal empire in India, several provincial governors and chiefs refused to accept the central authority, declared their independence and established their own rule over the areas they had under them. In 1732, Awadh, till then under the Mughal empire, became independent and continued to be governed by the Nawabs of Awadh till 1856. This period of some 124 years gave to Lucknow, the capital of the kingdom of Awadh, a composite Indian culture. Literature and medicine made phenomenal progress in this period. The munificence of the ruler of Awadh was instrumental in attracting poets, literateurs and physicians from different places, mainly from Delhi. In medicine, the following Hakims achieved extraordinary fame: Arshad Shifai Khan, 'Ali Sharif, Mirza 'Ali Khan, Mirza Mehdi, Iman Bakhsh Kirat puri, Muhammad 'Ali Asam, Masihal Dawlah, Mirza 'Ali Hasan Khan, Mirza Muhammad J'afar Muhammad 'Ali Nabba, Muhammad 'Ali Murtáish, Muhammad Asghar, and Muhammad Y'aqub.

Hakim Muhammad Y'aqub, progenitor of 'Azizi family

Hakim Muhammad Y'aqub was of Kashmir ancestry—his grandfather Maulawi 'Abdussamad, a scholar of Hadith, left Kashmir in 1750 and reached Delhi where he stayed

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for sometime. Later, he left for Faizabad, the capital of Awadh. When Asaf ud-Dawlah became the ruler of Awadh, he decided to have a new capital, and finding Lucknow more centrally situated than Faizabad, made the former his capital. Maulawi 'Abdussamad also came to Lucknow, where he settled. Maulawi Ghulam Nabi, son of Maulawi 'Abdussamad, received his earlier education from his father at Faizabad, and then went to Delhi for higher studies. There, he joined the *Madarsa* of Shah 'Abdul 'Aziz. After completing his education, he came back to Lucknow and started teaching *Islamic* theology in Lucknow.

Maulawi Ghulam Nabi had two sons, Hakim Muhammad Y'aqub and Hakim Muhammad Yusuf. Muhammad Y'aqub was born at Lucknow in 1790. He received his earlier education from his father and Mawlana 'Abdur Rab and received medical education from Hakim Syed Muhammad Asghar Husayni and Hakim Mir Muhammad Murt'aish (d.1841). Hakim Y'aqub was a sincere teacher and, over the years, he taught a large number of students. After the death of Hakim Murt'aish, it was Hakim Y'aqub, who filled the void and continued the ancient tradition of teaching as well as practising medicine. Among his students, the following achieved fame as highly accomplished Hakims: M'uizuddin Khalispuri Syed Asghar Husayn Farrukhabadi, Nur Karim Daryabadi, Fakhruddin Khayali Hasani, Syed Áli Husayn Khan Jaisi, 'Itrat Husayn Khan, Miraz Muhammad Nawab, Syed 'Abdul Hamid 'Azimabadi, and Muhammad Munib Khan Rampuri.

Hakim Y'aqub (d.1870) was a man of piety. Well-versed in *Hadith* and fond of good books, he built up a collection consisting of valuable works on medicine and religion. He was deeply involved to eliminate or at least to mitigate the suffering of all those who approached him. The royal rewards did not bring out any change in his austere living. Highly esteemed by the successive Nawabs of Awadh, he dedicated himself to the medical profession and considered it as the best means of an honest livelihood as well as of getting divine blessing. All his four sons, too, were successful Hakims. As a manifestation of his love for Unani medicine, his last direction was that none of his successors should adopt any profession other than that of a Hakim.

Hakim Y'aqub paid full attention to his patients, their relief and well-being, and his clinic soon became famous all over Awadh as an abode for the sick. Jhawai Tola (where the clinic and residence were located) is rated as a great medical centre, even today, partly because a few eminent physicians are still running their clinics in that locality and partly because of the functioning of the *Takmil al-Tibb* College.

Hakim Y'aqub died on 6 *Jamadi al-Thani* 1287 A.H./1870 A.D. at the age of 82[127].

***Hakim Asad 'Ali** (d.around 1867)* is counted among the experts of the healing art. He was born in Sahswan and was the pupil of Shaykh Ghulam Husayn Jaunpuri in mathematics and of Masih al-Dowlah Hakim Mirza 'Ali Hasan Khan (Lucknow) in medicine. Apart from *Hashiyah-i Nafisi,* he wrote many other books on medicine.

Hakim Ghulam Dastagir Khan Na iti, the son of Hakim Ghulam Ahmad, carried the name of Ghyath, as the name of one of ancestors Shah Ghyath al-Din, but with the penname of Lai'q. He was a chief physician during the Nawab's period in Madras. He used to run a school in his house to teach medicine. His collection *Tadhkira'-i Shu'ra* has been published with the title *Tadhkir-i Lai'q.*[128]

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Hakim Qadir Muḥiuddin Na iti bore the title of *Qadir Ahmad Khan* and *Muhtamim al-Dawlah* and *Sarbarah Khan Muhtamim Jang*. His grandfather Hakim Muhammad Sa'id Khan was also a noted physician, and a special physician to the ruler of Madras, Nawab A'zam al-Dawlah, while his father was a staff surgeon of A'zam Jah of Madras. Amir al-Hind Nawab Ghauth Muhammad Khan, the ruler of Madras, appointed him as the chief of the court physicians. At the end of the Nawabi rule, the British Government of India granted him a considerable pension which continued even thereafter. His son Ghulam Ahmad Na iti was also a capable physician[129].

Hakim Muhammad Mehdi Na iti was the son of Hakim Husayn 'Ali Khan Na iti. His title was *Sa'id*, and was also addressed as Hakim *Shifa Dast Khan*. During the Nawab rule, he was one of the members of the physician's *Majlis,* and his clinic was well-known in Madras[130].

Hakim Muhammad 'Ali Na iti (d.1873) was considered a generous Hakim. The ruler of Madras appointed him as a teacher in his medical institute, and later bestowed on him the title of *Hakim Hadhiq Yar Khan*. He was noted for his sociability, calmness and for answering questions on medicine after due deliberations[131].

Hakim Muhammad Ibrahim (d.1882), the eldest son of Hakim Muhammad Y'aqub, received theoretical education of *Tibb* from his father and completed the practical training under Hakim Mir Muhammad Murt'aish[132]. He was appointed a court physician for Rampur in 1865 during the reign of Nawab Kalb-i 'Ali Khan[133]. In addition to his duties as court physician, he discharged the functions of *Afsar al-Atiba* (Head of the state medical department). Though he had specialised in the treatment of dropsy, it was this disease which overpowered him. He left Rampur one year before his death and returned to Lucknow, where he died.

Hakim Ibrahim, even though he was a busy physician, set apart some spare time for teaching medicine, and helped a large number of students to become physicians. Most of his students moved to different cities and towns of India to establish their own clinics. He laid special emphasis on prescription writing and urged his students to acquire a comprehensive knowledge of materia medica. On several books on medicine, which formed part of his valuable collection, he wrote marginal notes. His acumen and proficiency are evidenced by the numerous cases recorded by his admirers and students[134].

Hakim Muhammad Ismá'il (d.1886), the second son of Hakim Muhammad Y'aqub, received medical education from his father and started his own clinic which soon became famous. When the rule of Nawabs of Awadh ended, his brothers, Hakim Muhammad Ibrahim and Hakim Muhammad Masih, left Lucknow, but he continued to stay there. After the death of his father, he succeeded him as physician in-charge and discharged his duties in that capacity for 16 years, besides being a consultant for several rulers of other princely states. Nawab Kalb-i 'Ali Khan, the ruler of Rampur state, and his uncle, Nawab 'Abbas 'Ali Khan, often called him to Rampur. In addition to working in the clinic, he took up the responsibility of teaching medicine. Students from different parts of the country as well as from outside India, e.g. from Kabul and Bukhara, joined his school to complete

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their education[135]. He constructed an imposing building in Jhawai Tola for the clinic of his eldest son, Hakim 'Abdul 'Aziz, and used part of it for his *Tibbi* classes. This building now forms part of the State *Takmil al-Tibb* College. His three sons, Hakim 'Abdul 'Aziz; 'Abdul Hafiz and Hakim 'Abdul Wahid, too became prominent physicians[136].

Hakim Muhammad Masih (d.1885), the third son of Hakim Muhammad Y'aqub, received his medical education from his father and started his practice. In 1856, when Nawab Wajid 'Ali Shah was disposed and deported to Calcutta, Hakim Masih went there with Khas Mahal (i.e., Wajid 'Ali Shah's wife) and stayed there for most of his life. In Calcutta, thousands of patients benefited from his practice. He had close association with scholars, and whoever came in contact with him was impressed by his perfect demeanour. He taught a large number of students and educated them as practising physicians. 'Abdul Halim Sharar, the noted Urdu novelist, was a student of Hakim Masih and completed full medical course under his guidance. Due to some difference between him and *Khas Mahal*, he left Calcutta, and came to Lucknow, just five years before his death[137].

Hakim Ghulam Mahmud Khan (1820-1892), after completing his education of Unani medicine, soon became a successful physician. For treatment, he mostly used *Mufradat* (simple drugs) and *Kushtajat* (calxes). The poor were especially indebted to him since he helped them monetarily, and did all that was possible to ameliorate their sufferings[138]. He wrote three books on Unani medicine: *Ḍiya al-absār, kārnāma-i 'Ishrat* and *Qanun-i Sharifi.*

During the uprising of 1857, he did his best to save the lives and properties of people, at great personal risk, his home being a safe haven for numerous displaced persons. The Maharaja of Patiala deputed some of his soldiers to protect the ancestral mansion of Hakim Mahmud Khan, where people had sought refuge and deposited their valuables. With this protection, the mansion became a strong citadel and served the unrooted people in their distress. Long after the uprising was over, people remembered him for his generosity, trustworthiness and the manner in which he had saved thousands of lives[139]. He had three sons: Hakim 'Abdul Majid Khan, Hakim Waṣil Khan III and Hakim Ajmal Khan III[140].

Hakim Ram Naraian 'Hayran', son of Munshi Meghu Singh Khatri and well-known for his poetic skills, was one of the followers of Nawab Fasih al-Mulk Dagh Dehlawi. With sufficient theoretical insight, he had a remarkable career as Unani physician. He learnt his medical skills from Hakim Bahauddin Khan and started his clinic (*matab)* both at Ajmer and Delhi. Highly creative and endowed with great powers of refined humour and thinking, he was also inclined towards discursive prose writing[141].

Hakim Seetal Parsad Jain belonged to a famous family named *Had Siyyon*. He was a member of a family, which for many generations had been devoted to the art of healing. His ancestor *Vaid* Shri Ram was a confidant of Nawab Farrukh Nagar, as also his personal physician. From the ancestral town Farrukh Nagar, his grandfather, *Vaid* Girdhari Lal, migrated to the Cantonment area in Delhi. There, he was hailed as a great scholar and an efficient physician. Besides being the father of Hakim Seetal Parsad, *Vaid* Jamuna Das

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was himself a physician of considerable repute. Hakim Seetal Parsad received his elementary education from his mother. Later, from his father, he learned basic lessons in Ayurveda, from ancient books. He learnt Urdu, Persian and English languages from government schools. He received his Unani instructions from the noted physician Hakim Maulavi Khairullah Beg, and had a successful medical practice in Delhi[142].

Hakim Muhammad A'zam Khan (1814-1901) left an indelible impression on the history of Unani medicine. In his lifetime, he was acclaimed as an extremely successful physician. At the age of 22, he left his birth place (Rampur) for Bhopal. He was associated with the ruler of Bhopal, Nawab Jahangir Muhammad Khan, and rendered medical services in Bhopal. The Nawab conferred on him the title of *Nazim-i Jehan*. After the death of the Nawab, the Maharaja of Indore invited him to Indore, and he flourished there as a learned scholar, prolific writer and skilled physician. The contributions made by him could be evaluated by the study of the books, which he produced and which constitute the richest legacy in Unani medicine.

His important and voluminous works are: *Iksir-i 'Ạzam* (four volumes), a comprehensive work on therapeutics, *Mohiṭ-i 'Azam* (four volumes), on simple drugs, *Rumuz-i 'Azam* (two volumes), on therapeutics; Qarabadin-i 'Azam a formulary; *Nayyar-i 'Azam,* on pulse examination; *Rukn-i A'zam,* on 'crises' in diseases; *Qustas-i A'zam,* a medical dictionary; and *Asma al-Adwiyah* on synonyms. The first five books have been published[143].

Hakim 'Abdul Majid Khan (1850-1903) studied books of *Hadith* from Nadhir Husayn, a well-known *Muhaddith* of his time. Hakim Ghulam Murtaḍa Khan and Hakim Ghulam Raḍa Khan taught him medicine[144]. After receiving theoretical education, he joined the clinic of his father, where he worked as an apprentice and gained practical experience[145].

Hakim 'Abdul Majid Khan's daily routine was an inspiring one. He got up early in the morning. First, he held his clinic and thereafter he attended to his students, and taught them the texts of Unani. In the afternoon, he again worked in the clinic and prepared answers to the queries, which his students had raised during the morning session. He used to clarify their doubts with suitable explanations. In the evening, he usually went out for a stroll. At night, he studied the cases of patients, who were critically ill and determined further course of their treatment. He revised the syllabus of Unani medicine, added more texts, divided the students into classes and started sessions. For anatomy, he included in the course *Sharh Tashrih A'ḍa-i Murrakaba* by Hakim Sadiq 'Ali Khan and enhanced the duration of the course from two to three years. To institutionalise Unani education, he founded a Unani Medical School at Delhi in 1888[146]. When plague broke out in Delhi in an epidemic form, Hakim 'Abdul Majid Khan opened camps for treatment and relief. At a conference, he explained, how plague could be controlled and its victims cured by means of Unani medicines.

In recognition to the services rendered by him, the Government of India conferred on him the title of *Hadhiq al-Mulk*. He charged no fee from a patient in Delhi, but only when he was called to visit an out-station patient[147].

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Hakim Sultan 'Ali Na iti (d.1903) had the little *Masih Nawaz Khan Bahadur*. He was one of the noted physicians of Madras during the Nawabi period. His son, Hakim Muhammad Ghauth 'Inayat, who succeeded his father, became a staff surgeon in a special palace of Nawab Khayr al-Nisa Begum of Nawab Ahmad Ghauth[148].

Hakim 'Abdul 'Ali (d.,1905), son of Hakim Muhammad Ibrahim, after receiving his religious education from the *'Ulama* of *Firangi Mahal* (Lucknow), turned to medicine, for which he had real aptitude and completed his studies under the guidance of his father and grandfather. He started his practice in the lifetime of his father and soon became popular. He did not discriminate between the rich and the poor. Most of his prescriptions were inexpensive, ingredients were a few, and the mode of administration was easy. His approach towards patients was always sympathetic. After the death of his father, who was the court physician and *Afsar al-Atibba* in Rampur State, he was appointed as special physician by Nawab Kalb 'Ali Khan, who also gave him the charge of the State's medical department. He stayed in Rampur till the death of the Nawab, thereafter he came back to Lucknow and re-started his medical practice.

On an invitation from Nawab Wajid 'Ali Shah who was seriously ill, he went to Calcutta again where he stayed for two months till the death of the Nawab. He went to Bhopal in 1898, where he was appointed by the ruling Nawab Shahjahan Begum as chief physician (*Asfar al-Atibba)*. He came back again to Lucknow, taught Tibb, also at Rampur and Bhopal. He was known for his profound knowledge of Ibn Sina's *Canon of Medicine* and took special interest in teaching, and training a large number of students[149].

Hakim 'Abdul 'Aziz (b.1855) was the eldest son of Hakim Muhammad Isam'il. He studied religious sciences under the supervision of the teachers of *Firangi Mahal* (Lucknow), and *Tibb*, from his uncle, Hakim Muhammad Ibrahim. He started medical practice and also undertook teaching of *Tibb*. His passion for Ibn Sina's *Al-Qanun fi'l Tibb* was overwhelming. He was one of those few who committed to memorise numerous long passages of the book and in the course of his class lectures quoted extensively from it. He acquired fame both as physician and teacher. Students from distant place came to Lucknow to join his class. Since he held mastery over the philosophy of Unani medicine, even some experienced Hakims came to benefit from his lectures and had long discussions with him. He rendered great services to *Tibb* by taking concrete measures for its institutionalized teaching and training. While performing his duties as a teacher, he realized that running one class for all students, regardless of their respective calibre, and the utilization of clinics for practical training was in no way a substitute for institutionalized education. He also recognized the need for surgery which was once an integral part of Unani medicine and in which field the fame of several Arab surgeons, notably of Abul Qasim Zahrawi, had remained unimpaired. As a first step, he placed his two sons, 'Abdur Rashid and 'Abdul Hamid under Lt.Col.J.Anderson, the Civil Surgeon of Lucknow and his personal friend, who made special arrangement for teaching them surgery. The two learnt anatomy and physiology, and completed the course which was specially designed for them. Later, they performed a number of operations. Their example induced many other *Tabibs* to learn surgery.

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As a second step, Hakim 'Abdul 'Aziz decided to establish a *Tibb-i* school. He provided the infrastructure with his own resources. The *Tabibs* of the 'Azizi family volunteered themselves to teach without any remuneration. The school, named the *Madarsah Takmil-i* Tibb, which commenced its work in 1902, in Jhawai Tola (Lucknow), condensed a three-year course and provided facilities for theoretical as well as practical education. Surgery was introduced as one of the subjects. Anatomy, physiology and chemistry were included in the syllabus as compulsory subjects. No tuition fee was charged, and poor students were assured of financial support.

Emphasis was laid on the teaching of *Al-Qanun* and its commentaries. The students, right from the first year of the course, were required to attend clinics for diagnosis and prescription-writing. Special arrangements were made for the teaching of anatomy, physiology and surgery. A small hospital was also attached to the school. There was an acute dearth of good books, and many of the old authoritative books were either out of print or in short supply. To meet that situation, Hakim 'Abdul 'Aziz persuaded Nami and Nawal Kishore, the two leading printing houses of Lucknow, to undertake the printing of Unani books and supply them at reasonable prices. Thus, many books, which otherwise would have been lost to posterity, were saved and became freely available. It was due to his efforts that *Al-Taṣrif,* Zahrawi's celebrated book on surgery, was printed by the Nami Press.

In 1902, plague broke out in Lucknow in an epidemic form and teachers and students of *Takmil al-Tibb* school worked day and night to prevent the epidemic from spreading further. The school later became a college. Now, it is functioning as one of the best institutions of India for the training of *Hakims*, and is affiliated to the University of Kanpur.

Hakim 'Abd ul-'Aziz had a well-disciplined fixed programme. He left Lucknow only when there was unavoidable insistence of out-station patients to be examined at their own places. Even then he did not leave Lucknow for more than three or four days at a stretch. He got up very early in the morning, came to his clinic at 9 a.m. and remained there till 1 p.m. His students sat in two rows. The prescriptions were dictated loudly to enable the students to note them fully and correctly. Full decorum was maintained in the clinic and waiting rooms, for, all patients, whether rich or poor, received equal consideration. He created job opportunities for his students and succeeded in getting several of them appointed as physicians in Bhopal, Baroda and other princely States. When he was only fifty-seven years old, unfortunately, he was attacked by paralysis. His brother, 'Abd al-Hafiz, treated him, but there was not much improvement. This great champion of *Tibb* died on 13th October, 1911, leaving six sons. The sons 'Abd al-Rashid, 'Abd al-Hamid, 'Abd al-Hakim, 'Abd al-Halim, 'Abd al-'Alim and 'Abd al-'Azim, all of whom learnt Unani medicine and, in course of time, became successful physicians.

In spite of his busy schedule, he managed to write a tract, in Persian, on how to estimate the temperaments of compound medicines and how an increase or decrease in the quantities of ingredients affects the temperament of a medicine. The tract, entitled *Risalah Tuhfa-i 'Azizi,* was published in 1888. Many of his prescriptions, whose efficacy were established, were preserved by his students and also recorded in the family prescription-books. This collection is a valuable asset for the practitioners of *Tibb*[150].

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Hakim Hafiz 'Abd al-Wali (1873-1914), the eldest son of Hakim Hafiz 'Abd al-'Ali, after completing the prevalent Oriental course of studies at *Firangi Mahal,* joined his father and uncle, Hakim 'Abd al-'Aziz, who taught him *Tibb* and admitted him to their clinics for practical training. Soon thereafter, he started his independent practice and also took up the additional responsibility of teaching. He reformed the old methods of teaching, placing greater emphasis on practical aspects than on text books. His lectures were generally free from controversial philosophical concepts. Since his simple method of teaching was greatly liked by his students, many other teachers of Tibb followed his example. For the benefit of students, he started a debating club[151]. All students were required to attend the weekly debates arranged by the club. Hakim 'Abd al-Wali presided over those debates and encouraged the students to raise and discuss question fearlessly and to find answers by themselves. He made an enormous contribution to Unani medicine by teaching hundreds of students, who after completing their courses, served as successful physicians in different parts of India[152].

Hakim 'Abd al-Wali joined the All India Ayurvedic and Unani Tibbi Conference of *Masih al-Mulk* Hakim Ajmal Khan and served its cause enthusiastically. He persuaded the Conference to hold a *Tibbi* exhibition at each of its annual sessions. The first exhibition was held in 1912, and thereafter continued to be regular feature for many years. He introduced certain innovations in treatment. For example, he made extensive use of 'cooling' drugs in treating those whom other physicians had declared to be suffering from hectic fever. He centred his entire attention on diagnosis and did not commence treatment until he was fully satisfied with the correctness of his diagnosis. The physicians attending on a lady with a weak stomach adopted the usual course of treatment, but her condition did not improve. Hakim 'Abd al-Wali examined her thoroughly, asked some questions and concluded that the usual course of treatment would not help her as she was extremely feeble. He advised her to avoid solid food and take juices of fruits in mixed quantities. After a few days, *'Arq-i Gulab* (distilled water of *Rosa damascena)* was given in addition to some very light drugs. The lady regained her health. Similarly, the physicians of a patient who vomited blood, declared that he was suffering from haemoptysis and treated him accordingly. Seeing no sign of improvement in his condition, he came to Hakim 'Abd al-Wali who, after examining him, came to the conclusion that it was not a case of haemoptysis but accumulated phlegm exerting pressure on blood vessels. He prescribed 'hot' drugs, which expelled the phlegm and the patient recovered fully[153]

Shifa al-Mulk Hakim 'Abd al-Rashid (1879-1920), eldest son of Hakim 'Abd al-'Aziz, was born in 1879. He received education of *Tibb* from his father, and other members of the family. *Hadya al-Rashidiya fi Usul al-Sarfiya* is a book written during his student life. He learnt surgery under Lt.Col.J.Anderson, who granted him a certificate, on the basis of which he could undertake some surgical cases.

In 1902, when plague broke out in Lucknow, Hakim 'Abd al-'Aziz and his two sons, Hakim 'Abd al-Rashid and Hakim 'Abd al-Hamid, rendered great service by treating thousands of plague patients and curbing the spread of the frightful epidemic. In the annual report of *Takmil al-Tibb*, Hakim 'Abd al-'Aziz wrote: "The epidemic, which had been taking a heavy toll of human lives in several cities of India, at last reached Lucknow

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and created an indescribable panic. All activities came to a halt. People did not venture to move out of their house, human value ceased to exist, and feelings of love and mutual help lost their meaning. The effect of plague was so terrific that people did not come near a dead body, and so it was hard to find a few daring persons to take the body to the graveyard or the cremation ground." In this bewildering situation, *Tabibs,* trusting in God, decided to contribute their maximum. They risked their lives but saved thousands and moved from place to place with stocks of medicines prepared in accordance with their own system. Their success restored confidence in people and demonstrated the efficacy of their system. "My services were freely available to people. My two young sons did not wait for a moment. For them, it was the time when they, by their free services and exemplary conduct, could get God's pleasure. They entrusted their own safety to their Lord, visited locality after locality, and strove to save as many poor patients as they could. God helped them".

Hakim 'Abd al,-Rashid wrote a tract on *Ta'un* (plague) in Urdu, which was published by *Matba 'Anwār-i Muhammadi,* Lucknow.

Besides the two sons, Hakim 'Abd al-'Aziz also trained his two nephews 'Abd al-Mu'id and 'Abd al-Majid – in surgery. All of them helped in the surgical work of the hospital of *Takmil al-Tibb*. As Principal of *Takmil al-Tibb,* Hakim 'Abd al-Rashid streamlined the administration, made necessary alterations in the syllabus, and worked for the all-round progress of the institution.

During his tenure (from 1911-1920), a unit was set up for the preparation of medicines to be given to patients. Emphasis was laid on pulse-examination and prescription-writing. In 1911, the total number of patients who attended the hospital of *Takmil al-Tibb* was about 9700, but by 1920 this number rose to over 23,000. In the surgery department, many indigenous drugs were successfully introduced.

'Abd al-Rashid, an ardent advocate of *Tibb,* insisted that the preservation of traditional medicine as well as other traditional arts and sciences demanded a measure, at least, equal to that meted out to ancient monuments. He said: "On the preservation of ancient monuments, which are made of bricks and mortar, vast sums of money are spent, while the gardens which our ancestors built and nurtured with their sweat, their mental prowess, and incessant labour, which benefited a large number of people and which are still rendering a distinguished service, are being neglected. These gardens have to be kept in proper shape, occasionally pruned, irrigated and guarded. All this needs funds, which the Government should release freely".

Hakim 'Abd al-Rashid, an accomplished and popular physician, had specialized in the diagnosis of chest diseases, and due to his high rate of success in the treatment of these disease, the other hospitals, too, referred some of their cases to him.

The government of India, in recognition to his services, conferred on him first the title of *Khan Sahib*, and than in 1917 the title of *Shifa al-Mulk.* Unfortunately, he died in 1920, when he was only forty-one years old[154].

Hakim Ajmal Khan III, (1863-1927) an illustrious *Hakim* and nationalist, who championed the cause of Unani medicine and brought about its resurgence, later came to be known as *Masih al-Mulk*. He completed his study of Unani medicine with his senior

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family members. In 1892, the Nawab of Rampur, Hamid 'Ali Khan, appointed him as his personal physician. Ajmal Khan remained at this post for nine years, during which period he made a meticulous study of the old medical manuscripts in the Nawab's library, consisting of 18,000 volumes. He took up the Unani medical practice, and his clinic was always full, and beyond its capacity. He would give cheap, but effective prescriptions as well as free medicines to those who could not afford them. Ajmal Khan could rightly diagnose the disease by feeling the pulse (*Nabḍ)* and observing the urine *(Qarurah)* of a patient. Engaged in activities of diverse nature, and attending to a large number of visitors other than patients, the *Sharif Manzil,* his ancestral home, had become the hub of important activities of Delhi.

Ajmal Khan's thorough study of the Unani System of Medicine, its intricacies, its problems, its future, made him come to the conclusion that the system had collected dust over the years and many theories had become redundant after the development of the scientific thought, and hence he felt that they needed a reinterpretation. In 1906, he established an *Anjuman-i Tibbiya* for running the *Tibbi* School started by his brother Hakim 'Abdul Majid Khan. In 1909, he founded a Unani School for ladies to provide medical relief to women, a great need at that time. Earlier, in 1904, the Unani and Ayurvedic Company was set up by his brother, Hakim Wasil Khan, for the production of reliable medicines and was transferred to *Anjumani-i Tibbiya*. Subsequently, the question of finding medicines of better quality came under consideration, and this Company was renamed as *Hindustani Dawakhana* in 1907. The *Dawakhana* not only produced medicines of better quality but also met the expenditure of *Tibbiya* College.

He was conferred with the title of *Hadhiq al-Mulk* in recognition of his services to the people and his efforts to promote the indigenous system of medicines. Hakim Ajmal Khan wished to raise the status of his Unani Medical School to that of a College, equipped to teach Unani along modern lines, and to convince his countrymen and the government that his indigenous system of medicine should be supported and developed. He purchased land for the college in Karol Bagh and, at his invitation, the then Viceroy, Lord Harding, laid the foundation stone of Ayurvedic and Unani Tibbia College on the 29th March, 1916. The building was formally opened on 13th February, 1921, by Mahatma Gandhi. Ajmal Khan also started the All India Ayurvedic and Unani Tibbi Conference, the first session of which was held in Delhi on the 26th and 27th November, 1910. The aim of this conference was to bring the *Vaids* and *Hakims* together on a common platform and discuss issues and problems facing the indigenous systems. It was intended to be a permanent organization, a movement of national upsurge for the promotion and protection of indigenous systems of medicine. This was a fitting response to a denigrating proposal of the British Medical Association of Bombay, which had recommended to the Government of Bombay to enact a Medical Registration Act for the registration of doctors, and since it thought that the indigenous Unani and Ayurvedic systems were unscientific and hence barbaric, the practice in these systems be banned.

Hakim Ajmal Khan was of the opinion that a physician should have a two-fold mission, namely to alleviate human suffering and to help prolong human life. He stressed the need for research and the use of modern sciences in indigenous medicine instead of blindly following old prescriptions. He appointed Dr.Salimuzzaman Siddiqi as the Director

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of the Research Institute of Ayurvedic and Unani Tibbiya College. Dr Siddiqi proposed the establishment of three departments: chemistry and pharmaceutical chemistry, pharmacology and botany, and pharmacognosy.

Hakim Ajmal Khan always laid emphasis on common sense and experience. His fame in Europe was due to his extraordinary insight into the causes of sickness. The well-known episode of his curing a French Lady, whose leg contracted due to spasms accompanied by acute pain in the stomach, carried his fame far and wide. Similarly, on one occasion, Hakim Ajmal Khan was with Dr. Ansari and Dr. Boyd at the Charing Cross Hospital of London. Dr.Boyd had examined a patient before the students of the hospital and given his own diagnosis. He requested Hakim Ajmal Khan to examine the case and gave his own diagnosis. The latter examined the patient carefully and declared that an ulcer in the upper part of the intestines was causing pain; the patient had jaundice and temperature. Dr.Boyd had a different opinion that there was swelling in the gall bladder of the patient and suggested that a surgical operation was performed. It revealed that Hakim Ajmal Khan's diagnosis was correct. Dr. Boyd was very much impressed by Hakim Ajmal Khan's insight into the causes of such serious sickness. In the previous case of the French lady, Hakim Ajmal Khan had learnt from the case-history that she was fond of riding and playing tennis which might have caused the twisting of her intestines into a knot; hence the resultant ailment. The medicines he administered to her, caused itching sensation in the intestines and thus the intestines became once again free to resume their normal functioning.

The services of Hakim Ajmal Khan and his family in the cause of Unani medicine are widely known. More importantly, the force and spirit with which he worked for the creation of the political consciousness in India has ensured him a place in the galaxy of top political leaders as well. At the time when the political landscape of India was bleak, Ajmal Khan was the only personality, who could rightly be proud of his universal popularity that cut across the barriers of community, sex, religion and belief.

At the session of the Indian National Congress and the Muslim League, held at Calcutta in 1917, Ajmal Khan came in contact with Mahatma Gandhi, and this was the beginning of a strong friendship between the two. He was a firm believer in Hindu-Muslim Unity. At the session of the Indian National Congress, held in Ahmedabad in December, 1921, Ajmal Khan was elected the President of the Congress. At the same time, he also presided over the *Khilafat* Conference.

Ajmal Khan's complete involvement in national politics did not deter him from the educational advancement, particularly, of the Muslims, who, in spite of the Sir Syed Movement, were still very backward in this respect. Ajmal Khan had earlier mooted the idea of establishing a college for the education of Muslims in Delhi, but due to his later involvement in the establishment of the Jamia Millia, he was forced to abandon his earlier commitment of the establishment of a Muslim college. He was elected the first Chancellor of Jamia Millia Islamia, in which he remained for the rest of his life.

Hakim Ajmal Khan suffered a massive heart-attack at Rampur and breathed his last between the night of 27th and 28th December, 1927. His body was brought to Delhi, and he was buried in the family graveyard[155].

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Hakim 'Abd al-Qawi (1882-1934) was the second son of Hakim Hafiz 'Abd al 'Ali, and after completing the Oriental course of studies, he learnt *Tibb* from his father and later joined the clinic of Hakim 'Abd al-Wali. When the latter died, Hakim 'Abd al-Qawi took the charge of his clinic. In addition to his duties as a physician, he started teaching *Tibb* also. In 1920, there was a great commotion in India due to the Non Co-operation and *Khilafat* Movements. Gandhiji had undertaken an extensive tour of the country, and people were urged to boycott foreign goods. Hakim 'Abd al-Qawi joined these movements, burnt foreign clothes and donated all the ornaments, which he had bought for the marriage of his niece. He wrote poems on political themes, which became very popular and were recited at political meetings and rallies. His house provided shelter to political workers. Towards the end of his life, he turned to mysticism, spend most of his time in prayers and became almost an ascetic. His son, Hakim Muhammad Rafiq Ibrahim who, following in the footsteps of his father, became a Unani physician[156].

Hakim 'Abd al-Waali (1884-1941) was the third son of Hakim 'Abd al-'Ali, graduated from Aligarh Muslim University, and at the insistence of his father learnt Unani medicine. He also joined the Non Co-operation and *Khilafat* Movements, and devoted his entire energy and time to them. On 27th December, 1921, he was arrested along with Maulana Shaukat 'Ali, Maulana Salamatullah of *Firangi Mahal,* Chaudhary Khaliq al-Zaman, Pandit Jawahar Lal Nehru, Pandit Balmukand Bajpai, and was jailed for one year[157]. On his release, he contested the election of Lucknow municipality, won it and became a member. Later, he moved to Barabanki, became the Secretary of its municipality, which office he held for a term of four years. After his term was over, he was elected Chairman and served Barabanki municipality in that capacity for twelve years. He was a fine orator and addressed political conventions along with such eminent leaders as Pandit Moti Lal Nehru, Pandit Jawahar Lal Nehru, Rafi Ahmad Kidwai and Mohanlal Saxena. He wrote a number of articles on political conventions. His articles on political issues in strongly-worded English were published in *Comrade*, the famous newspaper started and edited by Maulana Muhammad 'Ali, the leader of the *Khilafat* Movement.[158]

Shifa al-Mulk Hakim 'Abd al-Hamid (1884-1904), the second son of Hakim 'Abd al-'Aziz, learned Unani medicine from his father. Hakim 'Abd al-'Aziz, realizing the importance of surgery, decided to place his sons under Col.J. Anderson, who arranged for their study in surgery at Agra Medical School and Agra Thompson Hosptial.

In 1920, Hakim 'Abd al-Hamid was made Secretary of *Takmil al-Tibb*. As a first step, he concentrated his attention on the improvement of the syllabus and the methods of teaching. He perfected the arrangements for the teaching of anatomy, materia medica, chemistry and made practical training and prescription-writing compulsory.

Due importance was given to pulse-examination, urine examination (the two widely used means of diagnosis in Unani medicine), prescription-writing, and the examination of indoor and outdoor patients. Hundreds of simple drugs were collected and displayed. Students were required to examine the drugs, learn how to identify them, and find out their properties and actions. More equipment and apparatus were added to the laboratories. Within two years of his becoming Secretary, he succeeded in developing a

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strong base for revised Unani courses, which included surgery. A large dissection hall was also constructed.

In 1926, the Government of United Provinces established a Board of Indian Medicine, the first board of its kind in India, to promote indigenous systems of medicine. Hakim 'Abd al-Hamid, Shifa al-Mulk Hakim 'Abd al-Hasib Daryabadi and Hakim 'Abd al-Karim, editor of *Mashriq*, were nominated as its members to represent Unani medicine. The government also decided to establish a school and a college for Ayurveda and likewise, a school and a college for Unani. The Ayurvedic school was established at Hardwar, and the college at Banaras. The *Tibbi* school was opened at Lucknow, and *Tibbia* College at Aligarh Muslim University.

In 1935, the Hyderabad State decided to recognize its *Tibbi* Department. It was also decided to convert the *Tibbi* School into a full-fledged college with an appropriate syllabus. Hakim 'Abd al-Hamid, who was a member of the committee, was one of those who wanted to keep the course of studies strictly within the scope of Unani, and exclude all those theories and concepts that were not compatible with it. It was strongly felt that if theories and fundamental principles borrowed from other medical systems were allowed to make inroads into the well-defined territory of Unani, it would lose its individuality. Hakim 'Abd al-Hamid's view on the issue of indigenous medicine, which are relevant even today are summarised below:

(i) The structure of ancient medical systems should be kept intact, and they should have freedom to work and progress within their own conceptual frameworks;

(ii) In a country like India, indigenous systems of medicine need full encouragement and support. They have a glorious record of service. Even in the present changing conditions, they can hold their ground and made a positive contribution in solving the health problems of the country. What is needed is that the graduates, emerging out of the Colleges imparting education in Unani and Ayurveda, are genuine *Tabibs* or *Vaids*, acquiring a comprehensive knowledge in their respective system of medicine. And, further, they have studied most of the ancient texts which make the basis of their system. The syllabi must lay down principles to ensure that colleges would produce such *Tabibs* and *Vaids*. There are excellent colleges for the education of modern medicine, and well-equipped hospitals for the service of people. Thus, there is no need of schools or colleges for the mixed education of modern and ancient medicine. The indigenous systems of medicine should maintain their own characteristics, and work according to their own principles;

(iii) Indigenous systems of medicine have to survive in advance. They may take help from some modern subjects, but only to some extent. Concepts, which conflict with the well-settled principles of an indigenous system, should not be absorbed in or assimilated with that system. This process of synthesis is bound to confuse for students;

(iv) Vast segments of Indian population have an invincible faith in indigenous systems, and they want to benefit from them. However, they have no interest in a system which is neither purely modern nor purely indigenous;

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(v) Colleges of mixed education would do no good either to the modern medicine or indigenous systems. They would produce neither *Tabibs* or *Vaids* nor competent doctors;

(vi) The inclusion of few essential scientific subjects in the syllabus is not opposed; what is opposed is mixing such concepts and theories with those of an indigenous medical system, which would erode or spoil its character as a separate and distinct system. The utility of indigenous systems cannot be denied. They should be preserved and used in their pure and pristine forms. The importance or the utility of modern appliances for diagnosis is recognized, but they should be used only as auxiliary means. A *Tabib* or *Vaid*, depending on his own acumen, intellect, insight and wisdom gathered from a careful study of the authoritative books, should make full use of the means and methods of diagnosis adopted in to this system, as the same had proved their accuracy even in very challenging situations;

(vii) A medical system has it own theories and fundamental principles. A demand for modernizing an indigenous system would directly hit its theories and the resultant product would not be that system, but something else; and

(viii) Inclusion of principles and propositions of modern medicine in an indigenous system would undermine the very basis of the latter. A mixture of modern and ancient medicine, which affects the individuality of the latter, would harm both.

Hakim 'Abd al-Hamid was an admirer and friend of *Masih al-Mulk* Hakim Ajmal Khan, and extended to him his unstinted cooperation and support. *Masih al-Mulk*, too, had a great regard for him. Both of them encouraged promising students and young *Tabibs* to write papers and present them at the annual sessions of the All India Ayurvedic and Unani *Tibbi* Conference.

The dedication of Hakim 'Abd al-Hamid to the promotion of indigenous systems of medicine was well known. He represented the Government of India, as a delegate, at the All India Sanitary Conference, held at Lucknow (1924). The Government of India conferred on him the title of Shifa al-Mulk (1925); nominated as a member on the Allahabad Board of Persian, Arabic and *Tibbi* examinations (1927); nominated as a member of the Provincial Board for the Prevention of Epidemics (1929); and awarded a medal by the Government of India (1935). He remained a member of the executive committee of Nadwat al-'Ulama, Lucknow, for a number of years[159].

Hakim Syed Karam Husayn (1870-1953), son of Syed Imdad 'Ali, born in Tijara, (Rajasthan), was a towering personality of Unani medicine. In his lifetime, he struggled hard to extend the Unani medicine all over the Indian sub-continent. He belonged to the illustrious family of *'Ulamu* and *Hakims* and antecedents of Imam 'Ali Raza. His forefathers had migrated to India from Mashhad (Iran) *via* Gurdez (Afghanistan) during the reign of Sultan Shamsuddin Iltutmish (1211-35 AD).

He established the Dawakhana Shifaul Amraḍ, in 1894, at Tijara, after taking Unani medical course from Meerut from Hakim Muhammad Hasan Hadhiq and Hakim Baldev Sahai (pupil of Hakim Ahsanullah Khan of Delhi). His clinic-cum-dawakhana soon rose to its zenith. The demand for the supply of drugs was so much that the government had to

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open an exclusive post office for the *dawakhana*. He practised at his hometown till 1947. After partition, he shifted his clinic-*cum*-dawakhana to Bhopal. He was a dynamic personality of All India Unani Tibbi Conference and member of its standing committee. He was a close associate of Hakim Ajmal Khan, devoted to the promotion of Unani; he was also deeply engaged in religious affairs, and used to rise early at 2-3 a.m for prayers. He performed Hajj pilgrimage in 1934.

Hakim Karam Husayn was a mystic, poet, and wrote more than 24 books on Islam and Unani medicine. He also edited a monthly magazine, *Masiha-i Zaman* from 1927-1944. His two sons, Hakim Syed 'Atiqul Qadir (1910-2000) and Hakim Syed Fazlur Rahman (1912-1994), were also successful practitioners of Unani medicine. Hakim Syed Fazlur Rahman had one son, Hakim Syed Zillur Rahman[160].

Hakim Lachhman Parshad (d.1962) was an expert in medicinal plants and devoted a considerable part of his life to the identification, collection and classification of the flora, possessing medicinal properties. An old journal *Mastana Jogi* owed to his expert editorial patronage, the journal continued for a long time, carving a distinct niche for itself. Through this journal, he served the discipline of herbal medicine by disseminating useful knowledge to the masses as well as for the experts. It had a large circulation, with the result, that it became a popular periodical of its time and was considered as an authoritative contribution to the literature of Unani medicine.

Besides, Hakim Lacchman Prashad was one of the founders of All India Unani-Tibbi Conference. In 1952, the Conference was reconstituted and its first session was held on 7th September, 1952, where he was one of the most conspicuous invitees. His contribution to the proceedings of the Conference was highly appreciated. His entire life was remarkable for the extraordinary zeal for the development and the growth of Unani *Tibb*[161].

Hakim Ilyas Khan (1880-1963), son of Khan Amjad 'Ali Sherwani, and a resident of Sahawar town in the district of Etah in U.P., received his early education in Arabic-Persian at home after which he came to Delhi to study in Madarsah Aminiyah, where he was imparted instruction in *Dars-i Nizamiyah*. He completed his professional training in Unani *Tibb*, under the able guidance of Hadhiq ul-Mulk Hakim 'Abdul Majid Khan. Following his completion from the Madarsah, he started his own clinic at his ancestral place (Sahawar). Around the same time, Dr Ziyauddin toured Etah to collect funds for MAO College (Aligarh), and he extended an invitation to the Hakim to shift to Aligarh. In 1902, he came at Aligarh to open his clinic there. In 1909, when a Unani Hospital was established by *Viqar al-Mulk* for the students and college staff at Aligarh[162], he was deputed there as a consultant–physician. Later, at the instance of Hakim Ajmal Khan, he joined Tibbiya College at Karol Bagh, (Delhi), in 1921-22, the year of its establishment. He was Secretary of Majlis-i Tahqiq, started by Hakim Ajmal Khan. In the aftermath of student unrest in Tibbiya College, he was dismissed from there along with some other teachers. But he established, in 1935, another college named Jamia Tibbiya, which he handed over to *Hamdard Waqf* under the devoted trusteeship of Hakim 'Abdul Hameed. This college flourished under its new name, namely, Hamdard Tibbi College, which is still running successfully on the campus on the newly founded University: Jamia Hamdard.

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Hakim Ilyas Khan was also a dynamic leader and served as Secretary of the All India Ayurvedic and Unani Tibbi Conference, which held successful sessions[163]. After 1947, when India became free, he thought of the development of Unani Tibb and consequently he founded (1952) in Delhi, the All India Unani Tibbi Conference under the Presidentship of Hakim 'Abdul Hameed. Hakim Ilyas was, in fact, the life and blood of the Conference and its dynamic force. He served as member of the Board of Ayurvedic and Unani System of Medicine, constituted by Government of India in 1954, serving also on the committee for research in Tibb. Besides, he served on many other committees of Government of India like Chopra Committee, Pundit Committee, and Dave Committee. His masterpiece, entitled Kitab *Qanun 'Asri*, is reminiscent of his great learning. In fact, Hakim Ilyas Khan was one of the most outstanding physicians of modern India. He did yeoman service for the preservation and promotion of Unani Tibb after India's Independence[164].

Hakim Kabiruddin (1894-1976) was born in 1894, at Shaikhupura, Bihar, but received early education in Lucknow and Kanpur. After the completion of the study of basic subjects, he left Kanpur for Delhi for receiving the education of Unani Medicine. He joined Madarsah Tibbiya in 1909. He also passed *Zubdat al-Hukama* examination from Lahore Tibbiya College. In 1917, he was appointed Professor of *Tashrih* (anatomy) in Tibbiya College (Delhi). In 1935, he dismissed from Tibbiya College, and founded, along with Hakim Ilyas Khan and Hakim Fazlur-Rahman Khan, another Unani College, namely, Jamia Tibbiya at Delhi. In 1937, he went to Hyderabad and was appointed Vice-Principal at Nizamia Tbbiya College. In 1956, *Shifa al-Mulk* Hakim 'Abdul Latif Falsafi invited him to Aligarh, he joined the Tibbiya College, Aligarh Muslim University, as a reader, and served there till 1960. Later, he returned to Delhi and died there.

In 1916, Hakim Kabiruddin founded a publishing house, *Al-Masih,* to undertake the publication and supply of books on Unani medicine. It was this organization that issued the monthly journal, *Al-Masih*. Hakim Kabiruddin succeeded in enlisting for his organization the cooperation of such persons as Hakim Muhammad 'Abdul W'ahid, Hakim Muhammad Siddiqi, Hakim Sayyid Muhammad Yusuf Nayyar and Hakim Hibbatullah (all of whom had acquired proficiency not only in Unani medicine, but also in Arabic, Persian and Urdu), as well as Dr Mohammed Usman Khan, an expert in modern medicine. This organization succeeded in producing vast literature on Unani medicine in Urdu. Some of the books were translated, compiled or written by Hakim Kabiruddin, himself, others by his team of scholars at *Al-Masih*. Among the publications of the *Al-Masih* are: *Tarjuma-i Kabir, Ifad a-i Kabir, Tashriha-i Kabir, Munaf'a-i Kabir, Bayaḍ-i Kabir, Ilmul Jarahat, etc*[165].

Shifa al-Mulk Hakim 'Abd al-Mu'id (1885-1964), son of Hakim 'Abd al-Wahid, after completing Oriental studies, turned to Tibb and learnt it from his father, and uncle Hakim 'Abd al-Áziz. Later, he was closely associated with Takmil al-Tibb, and spared some time to teach there. He had the unique distinction of practising as a physician for sixty years. In 1919, he started a journal, *Khadim al-Atibba*, which was issued for three years. From 1930 to 1946, he served Takmil al-Tibb as its Principal, and from 1936 to 1962 as its honorary secretary. Though his practice as physician and the work of Takmil al-Tibb kept him busy, he managed to conserve time to work for the advancement of Tibb through

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various bodies. For years, he served as Joint Secretary of the All India Tibbi Conference, Lucknow, Secretary of Anjuman-i Tibbiya, U.P., member of the advisory committee of the Patna Tibbi school, member of the U.P. Board of Indian Medicine, and member of the education committee of Tibbiya College, Aligarh Muslim University. He presided over the 1939 annual convocation of the Patna Tibbi School, and delivered a thought-provoking address. In 1941, the Government of India conferred on him the title *Shifa al-Mulk*.

As a physician, Hakim 'Abd al-Mu'id attained immense popularity. Patients flocked to Lucknow to seek his help. The rush was so great that after a specific number of patients had come in, the gates were closed. He faithfully followed the examples of ancient physicians, gave a patient hearing to the patients, examined them thoroughly, and made full use of his vast knowledge and keen observation in determining the exact cause of patient's sickness[166].

Shifa al-Mulk Hakim 'Abd al-Latif Falsafi (1900-1970), son of Hakim 'Abd al-Wahid, after the death of his father, was educated by Hakim 'Abdul Hafiz and Hakim 'Abd al-Mu'id. On completing a part of the Oriental course of studies at Lucknow, he went to Rampur, where Maulana Faḍl-i Haq Rampuri, the renowned scholar, taught him the rest of the course. In 1917, he came back to Lucknow, joined Takmil al-Tibb and completed his education of Unani medicine. Later, he joined his *Alma mater* as a teacher till 1927. When Aligarh Muslim University Tibbiya College started functioning in 1927, he joined there as a teacher. In 1949, he became its Principal and retired in 1961. Under his supervision, the Aligarh Tibbiya College made phenomenal progress.

Hakim 'Abd al-Latif followed the traditions of old physicians, laid emphasis on the study of the philosophy of *Tibb*, and stubbornly opposed a combined education of different medical systems. In addition to *Tibb*, he made a deep study of logic, philosophy, physics, chemistry, as well as music. He had strong faith in the efficacy of indigenous systems of medicine, and at different forum forcefully advocated their inclusion in the national health scheme. For years, he served on the managing committee of Takmil al-Tibb College, and rose to become its President. Besides serving as a member of the board of trustees of A&U Tibbiya College, (Delhi), the advisory committee of the Tibbiya College (Patna) and the Malkote Committee appointed for the Nizamia Tibbiya College, (Hyderabad), he was also the Principal of Jamia Tibbiya, Delhi. As principal of the Aligarh Tibbiya College, he had already revised the syllabus to make it more consistent with the requirements of Unani. Later, as Convener of the syllabus committee appointed by All India Unani Tibbi Conference, he prepared a comprehensive syllabus. His services were duly recognized. In 1940, the Government of India conferred on him the title *Shifa al-Mulk*. When India became independent, he was taken as member of different Government committees.

Apart from his numerous articles on Tibb, he wrote the following books: *Al-Tahqiq al-Matlub fi al-Maal Mashrub, Tahqiq al-Maqal fi T'arif al-I 'tidal, Risalah Tarikh-i Tibb, Kitab al-Nabḍ, Hamari Tibb Main Hinduon Ka Sajha, Mukhtasar Tarikh-i Tashrih wa Munafey'wa Jarahat,* and the Urdu translation of *Kitab Al-Adwiyah Al-Qalbiyah* of Ibn Sina[167].

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Hakim Madan Mohan Lal Uppal (1920-1960) obtained his Kamil-i Tibb-o-Jarahat, a degree in Unani medicine from Tibbiya College of Delhi, started his clinic in Gole Market area of New Delhi. Sometime before 1950, he joined as a lecturer in Tibbiya College, Delhi. A knowledgeable physician, he earned repute for his contribution to the uplift of the Unani medicine in India. He led a successful and philanthropic life[168]

Hakim Mansa Ram Shukla (d.1968) served as a lecturer in Tibbiya College (Delhi). A reputed physician and an expert in dermatology, he founded the department of dermatology at Hamdard Nursing Home at Asaf Ali Road (New Delhi). Besides taking great interest in restoring dermatology its due place in medicine, he was also a politician and a member of Municipal Corporation of Delhi. As Chairman of Sadar Zone of Municipal Corporation of Delhi, he was active in the socio-political life of the capital[169].

Hakim B.N. Sharma (1915-1989). His full name was Bishambar Nath Sharma. He was popularly known with his initials as Hakim B.N. Besides working for some time in the Tibbiya College Hospital, he was the founder General Secretary of All India Unani Tibbi Conference at Delhi, and continued as such till 15 long years. In 1964, he was appointed Medical Superintendent of Hamdard Nursing Home, where he displayed his great qualities of organization and management. He was a consummate physician, owning a clinic at Gole Market (New Delhi). In the beginning, he had associated himself with Tibbiya College Hospital[170].

Hakeem 'Abdul Hameed (1908-2000) is literally the living protagonist par excellence of modern Unani medicine, and has enhanced its pride and prestige in India and abroad. To him, in fact, goes the great credit for familiarizing international community with the healing art and science of Unani medicine, infusing new life and vigour by his unremitting efforts and life-long association with this holistic system of medicine, and enabling it to reach impressive heights.

It was probably in 1930, having assumed the responsibility of running Hamdard, that he began to practise Unani medicine. Over the past seven decades, he has rendered yeoman service to Unani medicine. His dedicated contributions have ensured for him an exalted position in the history of Unani medicine in contemporary India. He accorded to his clinic the stations of prayers, and has served his patients with devotion and as an act of worship. He has tended the ailing, the tortured, the pained, and looked after them without making distinctions of their status in life in an exemplary manner.

Though a period of seventy years has lapsed since he became a physician, he has not relaxed his service to Unani medicine, still looking after the patients with the same devotion and attention as he did seventy years ago. His consultation is free and available to all. Indeed, Hakeem 'Abdul Hameed is the most popular and celebrated physician of the sub-continent.

In 1956, he went to Europe with his younger brother, Hakim Muhammad S'aid, where they concentrated, for the most part, upon drug factories. But they were not so insular as not to observe the other like the museums, zoological gardens, herbaria, and historic sites. They also saw the different antiques and relics of Greco-Arab medicine as well as priceless Arabic manuscripts houses in different museums of the West.

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Hakeem 'Abdul Hameed, after his stay in Europe, decided to adopt a synthetic approach, and laid the foundation of the Institute of the History of Medicine, so that he might be able to reconstruct the history of medicine and trace the interactions among different systems. The culmination of his efforts is Jami'a Hamdard, New Delhi, which today enjoys international reputation. Significantly, it also has a faculty of Unani medicine[171].

Hakeem 'Abdul Hameed is the recipient of several honours, both national and international: the Avicenna Award in 1983 of the USSR; Padma Shri in 1965, Padma Bhushan in 1991, and the Honorary Fellowship of the National Academy of Science, Iran, in 1995. He has been the Chancellor of two Indian Universities, Jamia Hamdard, since 1989, and Aligarh Muslim University, since 1996. He has written several books, including the following: *The Village physician*, in two parts (in English, Hindi and Urdu), 1959; *Hamdard Pharmacopoeia* (Urdu), 1964; *Qarabadin-i Hamdard*, 1967; *Philosophy of Medicine and Science: Problems and Perspectives, 1972*; *Theories and Philosophies of Medicine*, 1973; *Arab Medicine and its Relevance to Modern Medicine*, 1977; *Psychosomatic Medicine: New Guidelines*, 1982; *Avicenna's Tract on Cardiac Drugs and Essays on Arab Cardiotherapy*, 1983; *Exchanges Between India and Central Asia in the field of Medicine*, 1986; and *The Complete book of Home Remedies*, 1987.

Hakims in India, over the centuries, have held aloft the tradition of Unani medicine, which even today has been playing its role in the medicine of both the elite and the laity. The Central and the State Governments have been encouraging this system in the same way as is being done to Ayurveda and Siddha, and the three are complementary to one another. Each has its own materia medica fostered over a long period and of contemporary applications. Unani materia medica comprises more than 2000 simple drugs and compound formulations. A list of Unani drugs, which were introduced in India for the first time, and some important formulae of compound drugs are appended.

These would give an insight into the range of Unani medicines that continue to be employed both in the Unani hospitals and by private practitioners.

APPENDIX

Simple drugs

Aqaqia Acacia arabica, Willd; Bach Khurasani Acorus calamus; Khulanjan Alpinia galanga; Sibr Aloelittoralis, Koening; Anbar Anbra grasea; 'Aqarqarha Anacyclus pyrethrum, Dc; Annanas Ananas sativus, Linn; Babunah Anthemis nobilis, Linn; Kirmala Artemisia maritima, Linn; Afsanteen Artemisia sieversiana, Willd; Shaqaqul Asparagus racemosus; Luffah tropa belladonna; Habb-i balsan Balsamobendron opobalsum, Kunth; Zarishk Berberis lycium, Royle; Abresham Bombyx mori, Moth; Senna Cassia angustifolia; Jundbaidastar Castorem; Behman Safed Centaurea behem, Linn; Tudri Surkh Cheiranthus cheiri, Linn; Musli Safed Chlorophytum arundinaceum, Baker; Saqmunia Convolvulus scannonia; Mamiran Coptis teeta, Wall; Kabab Chini Cubeba officinalis, Mig; Musli Siyah Curculigo orchioides; Darunaj-'Aqrabi Doronicum hookeri,

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Roxb; Shirkhisht Fraxinus ornus, Linn; Ushna Haloxylon multiflorun; Sang-i Jarahat Hydrated magnesium silicate; Ajwayin-i khurasani Hyoscyamus niger, Linn; Irsa Iris florentina, Linn (root); Sosan Iris florentina; Narjil Daryai Lodoiscea sechennarum, Comm; Farasiyun Marrubiun vulgare, Linn; Badranjboya epeta ruderalis, Ham; Gaozaban Onosma bracteatum, Wall; Th'alab Misri Orchis mascula, Linn; 'Ud-Ṣalib Paeonia emodi; Hurmala Pegamum harmala, Linn; Anisun Pinpinella anisum, Linn; Maṣṭagi Pistacia terebinthus, Linn; Aloo Bukhara Prunus insititia, Linn; Dam al-Akhavain (Pterocarpus marsumpium, Roxb); Bihi-dana Pyru cydonia (seeds); cUsara-i Revand Rheum emodi, Wall, Ext; Revand Chini Rheum emodi; Sumaq Rhus coriaria, Linn; Gul-i Surkh Rosa damascena, Mill; Sudab Ruta graveolens; Bed-i Mushk Salix caprea, Linn; Gil-i Armani Silicate of alumina; Hajr al-Yahud Silicate of lime; Chob Chini Smilax china, Linn; 'Ushba-i Maghribi Smilax ovalifolia, Roxb; Māeen Khurd Tamarix articulata, Vahl; Māeen Kalan Tamarix gallica, Linn; Banafshah Viola odorata, Linn.

Compound Drugs

There are many comprehensive formularies (Qarabadins) developed in India. These formularies include the tested formulae by reputed physicians. *Qarabadin-i 'Azam* by Hakim 'Azam Khan is the last authoritative formulary in India, printed first in 1884, by Nizami Press, Kanpur. This formulary, like the other formularies, deals with a wide variety of compound medicines used in Unani system. For example:

For diseases of head and brain

Ayarij Faiqra: is useful for different kind of headache, facial paralysis, and expels dense humours from the brain and stomach.

Ayarij Kabir: is useful for all pain of the head and expels morbid matter from the brain. Strengthens the brain, stomach, sexual vigour and removes piles.

Ayarij Barid: is useful for hot diseases of the head, such as hot headache, and helps in pains of the ears and the teeth.

Itrifal Kishnizi: strengthens the brain and the stomach, and is very largely used in cold diseases of the head, ears and eyes, chiefly when the patient is suffering from catarrh, too. It is also used in different conditions of melancholia, for strengthening the heart, and as a laxative. Removes hot palpitation of the heart, checks production of gases in the stomach.

Itrifal Sana'i: expels morbid matter from the brain, removes constipation and gaseous piles, its prolonged use improves memory.

Itrifal Mulayyin: removes chronic headache, chronic catarrh and other diseases of the brain. Is useful for pains in eyes and ears. Expels phlegm from the brain and chest.

Itrifal Shahtara: is used, after purgation, in headache and other diseases caused by black bile.

Itrifal Ustukhuddus: is useful for headache and other diseases of the brain caused by phlegm and black bile. Removes forgetfulness, epilepsy, tremors and cold and moist diseases of the brain.

Itrifal Aftimun: is useful for diseases of the brain caused by black bile, expels the morbid humors from the brain, and is also useful for vertigo.

Itrifal Ma'mul: is useful in mania, corruption of blood, catarrh and the accent of gases.

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Itrifal Zamani: is used in melancholia, catarrh, colic and headache, and is used as an agent for expelling morbid humors from the brain and the stomach.
Itrifal Muqavvi-i Dimagh: strengthens the brain, is useful for catarrh and different part of the chest.
Itrifal Kathir al-Manafi: removes catarrh and ailments of the brain.
Anoshdaru-i Lulavi: strengthens the brain, dries its excessive moistness, removes melancholia and many other diseases cause by black bile. It is also useful for vertigo.
Ankabab: useful for hot headache, hot meningitis and insomnia. Some another formulae of Ankabab useful for cold diseases of brain, remove obstruction and catarrh.
Ābzan: useful for repletive spasm after purgation. Pāshuyah (cold): useful for hot diseases of brain. *Pāshuyah* (hot): useful for cold headache and all cold diseases of the brain.
Bakhur: used in hot headache after purgation. Another formulae of Bakhur are used in cold headache, sleeping sickness, migraine, moist convulsions, for releasing and discharging, through nose, the catarrh which is blocked.
Triyaq al-Nazla: checks catarrh and discharges from mucous membrane.
Triyaq al-dhahab: is useful for melancholia, epilepsy, leprosy, dropsy, jaundice and piles.
Julab: generally used in many diseases of brain, which are caused by black bile or phlegm and in facial paralysis.
Jawarish Shuniz: useful for improving memory.
Jawarish Shahi : Useful for melancholia, strengthens the heart and stomach, is also an exhilarant.
Jawarish Lulavi : Useful for melancholia, palpitation and headache caused by black bile.
Jawarish Sandalain : Strengthens the brain.
Jawarish 'Ud : Strengthens the brain. When it is moist and cold.
Jawarish 'Anbar : Strengthens the brain and senses.
Jawarish Jalinus : Useful in mania, headache and indigestion, preserves the black pigment of the hair.
Jawarish Amla : Removes forgetfulness.
Jograj : Useful for cold diseases of the brain.
Habb-i Ayarij : For expelling phlegmatic matter from the brain and body.
Habb-i Shabyar : Expels morbid matter from the brain, useful for headache, and is used both in winter and summer.
Habb-i Quqaya : Expels morbid matter from the brain, useful for cold diseases of the brain.
Habb-i Hindi : Useful for migraine and helmet headache.
Habb-i Jayyad : Useful for giddiness and phlegmatic vertigo.
Habb-i Halela : Useful for acute melancholia, expels black bile from the head.
Habb-i Mosil : Useful for expelling morbid matter from the brain, and for all other cold decease, chiefly for epilepsy.
Habb-i Favania : Useful for epilepsy, paralysis and other phlegmatic diseases of the brain. It is also used as a purgative in epilepsy and for expelling morbid matter from the brain.
Banadiq : Large pills, used for certain diseases of stomach, intestines and bladder.

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Forms of compound medicines

The total number of forms of compound medicines is about 90. The following list will give an idea of the expanse and coverage of the forms of drugs, as mentioned in *Qarabadin-i Qadri*, *Qarabadin-i 'Azam*, and other *Qarabadins* written by Indian physicians. (T'azimuddin,[172] *Studies in History of Medicine*, Vol. IV, No. IV, December, 1980, and September, 1981).

Abzan : The ingredients are boiled in water in a big vessel. The water is allowed to come to the level of luke-warm water in which a patient, generally suffering from diseases of the joints, is made to sit.

Ankabab : The ingredients are boiled in water and the vapours are inhaled by the patient, who is suffering from serious headache or cold diseases of the brain.

Anqaruia : It is a kind of electuary.

'Arq : Abstract of ingredients through the process of distillation. These are used either singly or as vehicles for other compound medicines.

Ayarij : it is prepared either in the form of a powder or an electuary.

Bakhur : The ingredients are placed on fire and the rising smoke is inhaled. These are used generally in headaches, migraine, sleeping sickness, cold and catarrh.

Barsha'sha : It is a well-known compound medicine of Unani system (a form of electuary), is an anodyne sedative, anti-convulsive and anti-maniacal. The active ingredient is opium, which is rendered agreeable by the mixture of saffron and other simple drugs.

Barud : A type of collyrium or eye-wash.

Basaliqun : It is a type of collyrium.

Dabid al-Ward : The formula was perfected by the prominent Indian physician *Hakim 'Alawi Khan*, and is generally used in diseases for the liver. It is a form of electuary.

Dawa : The ingredients are used in different forms as notified against each *dawa*. In some cases, a dawa (compound medicine) is used in addition to some other compound preparation to enhance the effect of either or both.

Dawa al-Misk : It is a form of electuary, is used in weakness of the heart, palpitation and for strengthening the brain, liver, stomach. Musk and pearls are active ingredients in many formulae of dawa al-Misk.

Dayaquza : It is a form of electuary, is generally used in diseases of the chest and the lungs and for cough etc.

Farzaja : Pessary.

Fatila : It means a wick or a thin strip of cloth with a few fold. This wick or strip of cloth is soaked in certain medicinal ingredients, which are ground with honey or oil or some other liquid and placed through the mouth of the wound.

Filonia : A kind of electuary.

Gharghara : Gargles.

Ghasul : A medicinal wash for eyes, face or the entire body.

Habb : Pill.

Haluwa : Medicinal confection used as tonic.

Hamul : A form of pessary.

Hasu : Thick sweetened liquid containing medicinal ingredients, which are first finely ground, used as tonic.

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Harira : A thin sweet gruel, used as a tonic for brain.
Huqna : Enema.
Itrifal : Which means three fruits. Halela (terminalia chevula Retz), Balela (terminalia belerica, Roxb) and Amla (emblica Officianalist). Iṭrifal has these three, and many other ingredients. The ingredients, besides the first three, vary according to the specific formula. Sugar is added to make that agreeable in taste. The *iṭrifals* are generally used in diseases of brain, eye, nose and ears. They also remove constipation, and strengthens the stomach and intestines.
Julanjabin : It is a confection made from rose petals, honey and other ingredients, and is used in certain diseases of the stomach and liver and in phlegmatic fevers.
Jawarish : *Jawarish* is the Arabicized form of Persian *Gawarish*, which means a tasteful digestive medicine. It is generally used for diseases of the stomach, liver and intestines. The ingredients are coarsely powdered so that the medicine could stay in the stomach longer. Sugar or honey is added as a preservative or to give a good taste.
Jograj : This compound medicine is generally used in cold diseases of the brain, paralysis, facial paralysis and tremors.
Julab : It is a thick sweet liquid containing medicinal ingredients, and is used in place of Ma al-'Asl (honey diluted in water) for certain diseases of brain and heart or for expelling morbid matter or for removing the constipation.
Kalknaj : It is mostly in the form of a syrup or electuary, and is prescribed for certain diseases of liver and specially for dropsy.
Kamad : Medicinal ingredients are placed tightly in a small cotton bag. This bag is warmed up by placing it on some hot object, and the affected part of the body is fomented with this bag.
Khagina : This is confection made from eggs, butter and medicinal ingredients, and serve as tonic.
Khamira : Is a form of electuary. First decoction is made of medicinal ingredients, the decoction is strained and sugar is added. By heating, a viscosity, thicker than that for the syrup, is obtained. Then, it is removed from the fire (heat) and pounded thoroughly till the *Khamira* acquires a thick paste-like form.
Khiḍab : Hair dyes.
Khubz : A round bread is made of flour of some grain mixed with certain medicinal ingredients. It is kept unbaked on one side which is smeared with some oil, and is placed and tied hot on the part of the body affected with the diseases. It is generally used in colic and some diseases of the stomach.
Kuhl : Collyrium.
Labub : These are electuaries containing kernels, specially of almond, pistachio, walnut, coconut, Asparagus officianalis, cotton seeds, water-melon and melon seeds and a large number of ingredients. They have aphrodisiac properties.
Lakhlakha : A fragrant liquid made from medicinal ingredients, which is inhaled, and is generally used for weakness of the brain, headache, and other hot diseases of the brain.
Lazuq : Medicinal ingredients are powdered and mixed with some sticking agents. The preparation is then spread over a piece of cloth or paper and is pasted on the temples. It is useful for migraine, and other headaches.

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La'uq : (Linctus, Loch). It is a sweet medicinal preparation of a thin viscosity so that it could be licked easily, and is generally used for diseases of the lungs (cough, asthma, etc), and diseases of the throat.
Ma-al-Lahm : It is liquid abstract of meat of different animals and fowls, and in a large number of medicinal ingredients, and acts as tonic.
Ma-al-Úsul : Hydromel.Maal-Usul : A decoction of medicinal roots.
Ma-al-Jubn : The thin serum of milk remaining after the curd has been removed (serum lactis).
Ma-al fukhtaj : Grape juice is boiled till it is reduced to one-third and gets thick.
Ma-al-Buqul : Fresh leaves of certain medicinal plants pounded and juice obtained.
Ma-al-Sawiq : Barley boiled in water till a thick gruel is obtained.
Ma-al-Sha'ir : Barley-water.
Maḍmaḍa : A liquid abstract of medicinal ingredient, a mouthful of which is taken without allowing it to pass down throat, retained in the mouth, and then spat out. It is generally used in thrush.
M'ajun : It is an electuary, consisting of medicinal ingredients, which are thoroughly mixed in honey (or sugar diluted in water), and heated to a degree where they acquire a thick viscosity. There are different formulae of M'ajuns for different diseases.
Marham : Ointment.
Masuh : A kind of ointment for piles.
Maṭbukh : Decoction (*Jaushanda*).
Mufarreh : Exhilarants. These resemble m'ajun in appearance and formation, and are generally used as a tonic for the heart.
Murabba : Fruits preserved in honey or sugar.
Muravwakh : A kind of ointment.
Munḍij : It is decoction, which is used to maturate the morbid matter before purgatives are given to expel the same.
Nafukh : Medicinal ingredients are finely powdered, the prescribed dose of which is blown into the nose or other openings through a thin tube-like instrument.
Naq'u: Medicinal ingredients are soaked in cold water at night and left over till morning when the water is strained, and without boiling, is given to the patients for drinking.
Nashuq : Medicinal ingredients finely powdered and rapidly inhaled through the nose, either in the form of powdered or after mixing the powdered in some liquid. This is generally used in headaches, sleeplessness or diseases of the nose.
Natul : Medicinal ingredients are boiled in water. The water is strained, and then a steam of this medicinal water is directed with considerable force on the affected part of the body.
Noshdaru: It resembles a M'ajun in appearance and formation, and is mostly prescribed for toning up the digestion. *Amla* (Emblica officinalis) is the main ingredient.
Pashuyah : Medicinal ingredients are boiled in water, which is strained and kept in a large vessels. When this water becomes tolerable, the feet of the patient are placed in it, and the shanks are massaged with this water from upside downward.
Pukhtajosh : Meat of a young lamb is boiled in grape juice till the meat disintegrates. This water is strained and again boiled with medicinal ingredients, strained and stored.
Qahwa : Medicinal coffee or tea.
Qairuṭi : A kind of ointment.

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Qaṭur : Medicinal drops which are dropped into the nose, ear or the opening of any other organ.
Qurs : Tablets.
Roghan : Oils.
Rubb : Juice of fruits or of vegetative drugs boiled till a thick viscosity is achieved. The process is used to preserve juices.
Safuf : Powders.
Sabagh : Compounds for improving complexion or for dyeing hair, heads, etc.
Sanun : Dentifrice.
Salaqa : Mouth-wash.
Sa'ut : Snuff.
Sharbat : Syrup.
Shamum : Snuff.
Shiyaf, Shafa : Suppository.
Sikanjabin : Oxymel.
Ṭila' : Liniment, epithem, embrocation.
Triyaq : Theriaca, antidotes, antitoxic medicines.
'Usarah : Extract.
'Atus : Medicinal ingredients finely powdered, and used as snuff for sternutation.
Vajur : Medicinal ingredients finely powdered, and mixed with some liquid. This liquid is dropped into the mouth or throat.
Yaquti : It is a form of electuary, precious stones, when properly characted through different processes, constitute the important ingredients. It is an exhilarant and, is used as a tonic for the brain, heart and liver.
Ḍamad : It is semi-liquid compound medicine, and is smeared thick on the affected part of the body (is for external application).
Zaruq : Medicinal liquid, injected by syringe, into urinary tract, penis, etc. in certain diseases of the bladder, urinary tract or in gonorrhea.
Dharur : Medicinal ingredients are finely powdered. This powder is sprinkled on external wounds or on the blisters of the mouth or tongue.

SOME FORMULAE OF COMPOUND DRUGS

Iṭrifal Usṭukhuddus

Recipe

Lavandula stoeches (*usṭukhuddus khushk*) 100 g.; Cuscuta reflexa (*aftimun*) 100 g.; Dried Emblica officinalis (amla *khushk*) 100 g.; Polygonum vulgare (*Bisphaij*) 100 g.; Perminania belerica (*post-i bahera*) 100 g.; Terminalia chebula (*halela zard*) 200 g.; Rosa damascena (*gul-i surkh*) 100 g.; Cassia angustifolia (*sana-i makki*) 100 g.; Terminalia chebula (*halela-i siyah*) 100 g.; Vitis vinifera (*mawaiz munaqqa*) 100 g.; White sugar (*shakar safaid*) 3 kilo g.; Citric acid (*satt-i limu*) 3 g.; Clarified butter (*ghee*) 120 g.;

Indications and uses: (i) for relieving the cerebral region of impurities, (ii) for relieving constipation and strengthening the intestines and digestive system (iii) for counteracting persistent cold, (iv) for retaining the original hair colour through regular

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use, and for restoring the original hair colour in the event of their becoming gray through cold.

Jawarish Zarishk

Recipe

Bambusa arundianacea (*ṭabashir*) 50 g.; Pbrtulaca oleracea seeds (*tukhm-i khurfa*) 50 g.; Myrtus communis seeds (*hub al-ās*) 50 g.; Rhus coriaria (*sumaq*) 5 g.; Rosa damascena (*gul-i surkh*) 50 g.; Baked Coriandum sativum pulp (*maghz-i kishniz*) 50 g.; Berbris aristata (*zarishk*) 100 g.; Vitis vinifera (*mawaiz munaqa*) 100 g.; Cydonia vulgaris ext. (*Rubb-i bihi*) 530 ml; Rumex aquaticus syrup (*sharbat-i hummāz*) 530 ml; Citrus medica juice (*āb-i turanj*) 530 ml; White sugar (*Shakar safaid*) 530 g.; Mineral bezoar finely ground (*zehar mohra saida*) 530 g.;

Use and indications: (i) especially suited for people with warm temperament; and, (ii) emetic and appetizing.

Joahar Seen

Joahar seen is the *Joahar* (quintessence) of *sammulfar* (*sankhia*, arsenic oxide). Since the Urdu *seen* is the first letter of the oxide, this *Joahar* has been named *Joahar seen.*

Recipe

Arsenic oxide (*sammulfar safaid, sankhia safaid*) 100 g.; Brandy 200 ml;

Uses and Indications : (i) stomachic (ii) digestive and appetising, (iii) cerebral, cardiac and nervine tonic (iv) increases body heat (v) aphrodisiac (vi) anti-phlegmatic and anti-catarrhal, especially for phlegmatic and old persons.

Ayarij Faiqra

Recipe

Valeriana bardwickii (*tagar, asarun*) 70g.; Aloe barbadensis (*ailwa*) 400g.; Valeriana officinalis (*balchar*) 25g.; Cinnamomum cassia (*taj*) 25g.; Balsamodendron opobalsamum (*habb-i balsan*) 25g.; Cinnamomum iners (*dārchini*) 25 g.; Balsamodendron opobalsamum wood (*'Ud balsan*) 25g.; Pistacia lentiscus (*masṭagi*) 25g.; Crocus sativus (*z'afran*) 8 g.;

Uses and indications : (i) antiphlegmatic and anticatarrhal, especially in the cerebral region. (ii) Phlegm clarifier of the brain (iii) for apoplexy, migraine, and other phlegmatic ailments.

Hab Shabyar

Recipe

Aloe barbensis (*ailwa*) 35 g.; Terminalia belerica peel (*poast bahera*) 35 g.; Terminalia chebula peel (*poast halela zard*) 35 g.; Ipomoea hederaceae (*habb al-nil, kaladana*) 60

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g.; Cassia angustifolia (*sana*) 35 g.; Rheum emody rhizome, dried (*'Usara-i raiwand*) 5 g.; Cochlospermum religiosum (*katira*) 15 g.; Boswellia glabra resin (*loban, kundur*) 35 g.; Red ochre (*gil-i surkh*) 65 g.; Balsamodendron gugula (*gugul*) 5 g.; Pistacia lentiscus (*masṭagi*) 5 g.

Uses and indications : (i) resolvent of the cerebro-spinal, stomach, and bowel effusions. (ii) relieves headache, heaviness in the head, ear ache, hard hearing, quarternary fever, recrudescent fever, optic inflammation, stomach and lever inflammation and bronchitis; and (iii) recomposes the varicose veins, when applied with almond oil (*roghan-i bādām*) in the form of a paste.

Khamira Abresham Hakim Arshadwala

Recipe

Bombyx mori (*ābresham muqarraḍ*) 640 g.; Aquilaria agallocha (*'Ud hindi sai'da, agar*) 8 g.; Valeriana officinalis (*bālchar*) 10 g.; Citrus medica peel (*poast turanj*) 10 g.; Myrtus caryophyllus (*laung*) 10 g.; Elettaria cardamomum, grains (*dana ilaichi khurd*) 10 g.; Santalum album sawdust (*burāda sandal safaid*) 12 g.; Cinnamomum cassia (*sadhaj hindi, tezpāt*) 10 g.; Sweet punica granatum extract (*rubb-i anār shirin*) 320 g.; Cydonia vulgaris, extract (*rubb-i bihi*) 320 g.; Pyrus malus extract (*rubb-i saib*) 320 g.; White sugar (*shakar safaid*) 2 kilo g.; Honey (*shehed*) 500 g.; Citric acid (*satt-i limun*) 4 g.; Ambra grasea (*'anbar ashhab*) 12 grams; Sodium benzoate (*nitrun bunzawi*) 3 g.; Triturated Corallium rubrum (*shakh-i marjan saida*) 6 g.; Triturated Vateria indica (*kahruba-i sham'ai saida*) 6 g.; Triturated pearls (*marwarid saida, moti*) 25 g.; Triturated saphires (*yaqut saida*) 20 g.; Triturated green agate (*yashab sabz*) 20 g.; Crocus sativus (*z'afran*) 20 g.;Musk (*mushk*) 1 gram; Pandanus odoratissimus essence (*'arq-i keora*) 100 ml; Gold foil (*waraq ṭila*) 640 millig.; Silver foil (*waraq nuqra*) 32 g.

Uses and indications : (i) cardiac, cerebral, and liver tonic (ii) especially effective against cardiac weakness (iii) anti-fibrillant and tranquilizing (iv) especially effective during convalescence.

Khamira Gaozaban 'Anbari Jawaharwala

Recipe

Bombyx mori (*ābresham muqarraz*) 10 g.; Lavanduia stoechas (*usṭukhuddus*) 50 g.; Nepeta hindostana (*badranj boya*) 100 g.; Santalum album, sawdust (*burāda sandal safaid*) 100 g.; Onosma bracteatum, leaves (*burg gaozaban*) 225 g.; Salvia haematodes, crushed (*behman surkh nim kofta*)100 g.; Centaurea behen, crushed (*behman safaid nim kofta*)100 g.; Lallemantia royleana (*tukhm-i bālanga*) 150 g.; Cheiranthus cheiri, yellow variety (*tudri zard*) 200 g.; Dried Coriandrum sativum (*kishniz khushk, dhanya*) 100 g.; Onosma bracteatum, flowers (*gul gaozaban*) 100 g.; White sugar (*shakar safaid*) 8 kilog.; Citric acid (*sat limun*) 20 g.; Sodium benzoate (*nitrun bunzawi*) 6 g.; Ambra grasea (*'anbar ashhab*) 6 g.; Silver foil (*waraq nuqra, chandi ke waraq*) 32 g.; Triturated mineral bezoar (*zehar mohra*) 20 g.; Triturated emerald (*zamarrud saida*) 20 g.;

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Triturated pearls (*marwarid saida*) 20 g.; Triturated green agate (*yashab-i sabz saida*) 20 g.;
Uses and indications : (i) cardiac and cerebral tonic (ii) eye tonic.

Dawa al Kurkum Kabir

Recipe

Andropogon citratus (*izkhar Makki*) 10 g.; Valeriana hardwickii (*asārun, tagar*) 40 g.; Pimpinella anisum (*anisun*) 40 g.; Valeriana officinalis (*balchar*) 60 g.; Cinnamomum cassia (*taj*) 10 g.; Daucus sativa, seeds (*cultivated carrot, tukhm gājar*) 40 g.; Ajuga iva (*ju'da Rumi*) 30 g.; Balsamodendron opob'alsamum, fruit (*habb-i balsan*) 10 g.; Daucus carota (*wild carrot, doqu*) 40 g.; Rheum emodi (*rewand chini*) 40 g.; Glycyrrhiza glabra extract (*rubb al-sus siyah*) 30 g.; Prangos pabularia (*fiṭrasaliun*) 40 g.; Saussurea lappa (*qust shirin*) 10 g.; Delphinium zalil, flowers (*gul ghāfis*) 30 g.; Rubia cordifolia (*majith*) 40 g.; Balsamodendron myrrha (*mur makki*) 40 g.; Honey (*shehed*) 1kilogram + 600 g.; Onosma bracteatum, aqua (*'arq gāozabān*) 20 g.; Pistacia lentiscus (*masṭagi*) 100 ml; Ghee 30 g.; Balsmodendron opobalsamum, oil (*roghan balsān*) 10 g.
Uses and indications : (i) for lever and spleen ailments (ii) lever and spleen tonic (iii) antidyspeptic (iv) kidney and gallbladder tonic (v) anti-hydrotic especially effective in dropsy.

Dayaquza

Dayaquza is an Arabic derivative of the original Greek word, meaning the juice of Papaver somniferum. *Dayaquza*, the Papaver somniferum peel happens to be one of the main constituents, and therefore the implication of the name is obvious.

Recipe

Glycyrrhiza glabra (*asal al-sus*) 100 g.; Plantago ovata (*isapghul*) 25 g.; Onosma bracteatum, flowers (*gul-i gaozaban*) 50 g.; Althaea officinialis, seeds (*tukhm khaṭmi*) 28 g.; Cordia latifolia (*sapistān*) 25 g.; Zizyphus vulgaris (*'unnab*) 50 g.; Papaver somniferum or poppy seeds (*kokinār*) 100g.; Viola odorata, flowers (*gul banafshah*) 50 g.; Nymphaea alba, flowers (*gul nilofer*) 50 g.; White sugar (*shakar safaid*) 2 kilog.; Cochlospermum religiosum (*katirā*) 25 g.; Acacia arabica gum (*gond kikar*) 25 g.; Citric acid (*sat limun*) 3 g.; Sodium benzoate (*nitrun bunzawi*) 3 g.
Uses and indications : (i) provides relief to acute catarrh, and cough as the consequence thereof (ii) expels phlegm from the lungs.

RESEARCH

The concept of research in Unani system of medicine was originally perceived by Hakim Ajmal Khan in the 1920s. Systematic research in various Indian systems of medicine, including Unani medicine, under the patronage of Government of India, started in 1969, with the establishment of Central Council for Research in Indian Medicine and Homeopathy (CCRIMH). In the year 1978, the CCRIMH was split into four separate research councils, one each for Ayurveda and Siddha, Unani medicine, Homeopathy, and

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Yoga and nature cure. The Central Council for Research in Unani medicine is engaged in the multi-faceted research activities. The areas for research include clinical research, drug research, survey and cultivation of medicinal plants, literary research, and family welfare research programme.

The research activities of the Council are being carried out through a network of thirty one institutes, units functioning in different parts of the country. The Council has made significant strides in various research programmes. The research programme of the Council has been so devised that not only the system could stand on solid scientific foundation and be acceptable to the scientific world, but also its benefits could be extended to the common man, particularly the underserved living in rural and far-flung areas. Greater emphasis is being placed on achieving the national priorities.[173]

The diseases on which clinical trials have been undertaken include *Bars (vitiligo), Nar-i farsi (eczema) Da' al-Sadaf (psoriasis), Iltihab-i Kabid (infective hepatitis), Husat al-Kuliya wa al-Mathāna (renal and bladder calculas), Qarah-i M'eda wa Athna-i 'Ashari (gastric and duodenal ulser), Ishāl-i Muzmin (chronic diarrhoea), Ishāl-i Atfāl (infantile diarrhea), Didān-i Am'a (helminthiasis), Humma-i Ijamia (malaria), dhusantaria-i M'evi (amoebic dysentery), Kala Azar (leishmaniasis), Da' al-feel (filariasis), Dhiabetus Sukkari(diabetes mellitus), Waj'a al-Mafasil (rheumatoid arthritis), Iltehab-i Tajaweef-i Anf (sinusitis), Ḍeeq al-Nafas (bronchial asthma), and Sailan al-Rahem (leucorrhoea).*

The first post-graduate department of Unani medicine was established on the subject of Ilmul Advia (pharmacology), in Aligarh Muslim University, in 1972. About 100 theses were prepared in the department in the ensuing 25 years as partial fulfilment for the award of the Degree of Doctor of Unani Medicine. Besides five other post-graduate departments in Aligarh Muslim University, three post-graduate departments in Osmania University Hyderabad, two in Hamdard University, New Delhi, and one each in Lucknow and Allahabad are busy in research activities.

To-day, more than 45,000 Unani physicians are practising it with success. Thousands of people of every class are being treated and relieved of their ailments by them. There are about thirty-five under-graduate colleges in Aligarh, Delhi, Lucknow, Allahabad, Patna, Hyderabad, Mumbai, Chennai, Indore, Bhopal, Pune, Nagpur, Calcutta, and other parts of the country. To each of these Unani Colleges is attached a hospital for the outdoor and indoor patients.

There are also many flourishing pharmaceutical laboratories (*Dawakhanas*), which prepare various kinds of compound drugs according to the Unani System. Hamdard Dawakhana Delhi is the biggest pharmaceutical company, which runs a full-fledged University in New Delhi, Dawakhana Tibbiya College, Aligarh, Rex Remedies New Delhi, New Sharma Delhi, National Dawakhana, Calcutta, Tayyabi Dawakhana, Indore, Hindustani Dawakhana Delhi, Islahi Dawakhana, Mumbai, and hundreds of other pharmacies at other places. Some products of Unani Medicine are being employed by allopathic practitioners, too. An important example of them is the *Dawa al-Shifa*, which has been reproduced by allopathic companies under the various names like *Serpasil*. The *Dawa al-Shifa* was introduced by Hakim Ajmal Khan, after whose name have been designated *Ajmaline* and *Ajmalinine*, two of the alkaloids of *Rauwolfia Serpentina*, for curing blood pressure.

Unani system of medicine, with its own recognized practitioners, hospitals an educational research institutions, forms an integral part of our national health care delivery system.

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140. Zillur Rahman, S, (b), p. 207.
141. Ram, Lala Siri, Vol. II, p. 538.
142. Firozuddin, Vol, II, p. 468.
143. Siddiqi, Ta'zimuddin, (d), p. 229.
144. Hasani, Vol, VIII, p. 310.
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146. Ahmad, Nazir Deputy, Vol, I, p. 175.
147. Siddiqi,Ta'zimuddin (b), p. 1-18. Zillur Rahamn, S, (b), p. 236-241.
148. Chandpuri, (b), p. 294.
149. Zillur Rahman, S, (f), p. 99-105.
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152. Ibid. (c), p. 314.
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156. Zillur Rahman, S, (f), p. 221-225.
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158. Zillur Rahman, S, (f), p. 227-234.
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160. See, Hayat-i-Karam Husayn for his biographical study.
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162. Nadwi, Ikramullah Khan, p. 506.
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CHAPTER 13

Siddha Medicine

B.V. Subbarayappa

Of the Indian medical trinity—***Ayurveda, Unani and Siddha—Ayurveda*** has its roots in Vedic literature, while Unani, which is Greco-Arabic medicine, owes its origin to Central and West Asia. Neither of them, however, had any alchemical undertone. Siddha is regionally confined to Tamil Nadu and its adjoining areas among Tamil-speaking people. There is a proverb in Tamil that 'a physician is the son of an alchemist'. The alchemical supremo, mercury and sulphur, as well as several other metals and minerals have pride of place in Siddha medicine, unlike in Ayurveda and Unani.

The theoretical basis for Ayurveda has been provided by the *Sāṇkhya, Nyāya* and the *Vaiśeṣika*, three of the orthodox Indian religio-philosophical systems. The rationale of Ayurveda encompasses *prakṛti*, the three *guṇas (sattva, rajas, tamas)*, the *pañcamahābhūtas* (five 'elements'), *dravya* (substances) and the attributes, all of which are a part of the aforesaid three systems. Conceptually, one finds symbiotic relationship between the postulates of Ayurveda—the formation of embryo, physiological processes including digestion and metabolism, the states of health and disease, foodstuffs and drugs—and those of the *Sāṅkhya, Vaiśeṣika* and *Nyāya*. Unani, too, has its foundational ideas in the matrix of the philosophies of Empedocles and Aristotle as well as the exponents of Hippocrates. But the Siddha, it would appear, did not develop along these lines in its initial stages, although it was, and continues to be, influenced by *yoga* of Patañjali and, in particular, by its meditational dimensions.

The real source of inspiration for the Siddha system in its formative stages was the Chinese Taoism, its *yin* (female) and *yang* (male) principles and their association with mercury and sulphur as well as certain esoteric practices of Taoists, who sought to attain immortality of the body or to become celestial or earthly immortals or 'perfected' human beings. Interestingly, the word, *Siddha* means a 'perfected' or accomplished human being, who has mastered the eight supernatural powers (*siddhi*). Such a 'perfected' immortal could become or possess at his *will* eight *siddhis: aṇima* (as tiny as an atom); *mahimā* (very large) *laghimā* (extremely light, able even to float in air); *garimā* (capable of expansion); *prāpti* (power to obtain any desired object); *prakāmyaṃ* (irresistible will to

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perform); *īśitvam* (lordship over everything); and *vaśitvam* (power of subdueing). The Tamilian tradition affirms that Siddhas (hence the name) are still alive with their supernatural powers. According to one tradition, among the 18 Siddhas were: Nandīsar, Agastyar, Tirumūlar, Bhogar, Punnākīsar, Pūnaikaṇṇer, Rāmadevar, Iḍaikkādar, Pulakaisar, Karuvūrār, Konganavar, Aluganṇi, Chettai muni, Kalangi Nāthar, Theraier, Pambaṭṭisiddhar, Pulastyar and Sundarānandar. Some contemporary Siddha practitioners have their own list with minor variations in the names of Siddhas. Even a divine origin is attributed to Siddha system, to Lord Śiva, who is supposed have imparted medical knowledge to Nandi (divine bull) who, in turn, taught it to sage Agastyar. It may be noted that Brahmā is the divine origin of Ayurveda.

Variations in the lists of Siddhas apart, Agastyar, Nandīsar, Tirumūlar and Bhogar, and one or two others have been recognized as the most important Siddhas. The dates of these Siddhas are uncertain. But Tamilian tradition speaks of their remote antiquity. But, if one looks at the seed-ideas of Siddha system and its alchemical aspects, it would be difficult to avoid the conclusion that Agastyar, Nandīsar, Tirumūlar and Bhogar might have lived in the area now comprising Tamil Nadu around the fifth century A.D., while the other Siddhas were of later period even up to the fifteenth-sixteenth century A.D. Of the four important Siddhas, it is significant to note that Bhogar, according to Tamilian tradition, was probably a Chinese, who was an adept in alchemy and iatro-chemistry alike.

Immortality

Historians of chemistry generally agree that the original home of alchemy was China with its twin aspects of aurifaction ('gold-making') and elixirs for attaining what was known as material immortality or 'deathlessness'. In this respect, cinnabar or a compound of mercury and sulphur (naturally occuring mercuric sulphide), its male-female nuances and its presumed power of conferring immortality, played a pivotal role. The Taoists believed that the 'essence of cinnabar produces gold' (Needham, p.65). Potable gold elixir (pp.66-67) was also associated with the Taoist concept of 'ascent to the perfected immortailty'. A Chinese manual of immortals even recorded that 'gold can be made from cinnabar. This is the reason why gold generally appears in the mountains below the cinnabar deposits are found'. In other words, mercury and sulphur on the one hand and, on the other, gold elixir were intertwined with immortality. In the Vedic literature, one finds references to the identification of gold with immortality (*Śatpatha Brāhmaṇa,* XIX, 26.i; XIII, 2,ii,16;5.ii,6). In addition, one also notices that *soma* was regarded as the 'herb of immortality'. But nowhere, either in the Vedic or post-Vedic literature, does one observe any mention of cinnabar in the context of attaining immortality.

In the Chinese alchemical ensemble, cinnabar, sulphur and the two sulphides of arsenic were even regarded as 'semi-magical substances' through the mediation of fire. Cinnabar elixirs were extolled for their power of bestowing longevity and, more importantly, even immortality on a devoted individual who would take it. Such elixirs had established themselves by the third or fourth century A.D. among the Taoists. A text of

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this period, *Pao Phu tzu*, proclaimed that, 'the least of the cinnabar elixir is far better than the best things of the plant world. When submitted to fire, all plant substances are burnt to ashes, but cinnabar produces liquid silver (mercury) and this, after a whole series of transformation, can revert to cinnabar again. That far exceeds what plants can do. Hence (such chemicals) can confer longevity and immortality. *Only the holy immortals have understood this pattern and principles (li). How infinitely different are they from ordinary people'* (emphasis added).

By about the third century B.C., the Chinese term *hsienjen* or *hsien,* which from its ancient connotation of 'drunken, dancing and capering' had acquired the meaning of Heavenly *(thein hsien)* or Earthly *(ti hsien)* Immortals. In his quest for becoming either a Heavenly or Earthly Immortal, a devout Taoist, apart from taking alchemical elixirs, resorted to respiratory, meditational, gymnastic, dietetic, helio-therapeutic and even certain sexual techniques, by which he believed that he could elevate himself to the status of an immortal. The pathway towards attaining immortality therefore, was both esoterically alchemical and rigorously physiological. In any case, the attainment of the state of 'deathlessness' was a goal towards which a Taoist ceaselessly endeavoured with a persistent belief in it.

It is indeed interesting to note that a revered Siddha, Tirumūlar, in his magnum opus, *Tirumantiraṃ* (3000 stanzas), has included in his definition of medicine a statement: 'that which ensures preventive against mortality'. The word *śarīra* (body) in Ayurveda has the connotaion of decay or disintegration. In other words, Ayurveda recognizes the mortality of the physical body, although it believes that what is known as *sūkṣma śarīra* (bereft of the gross five elements) would pass on from one birth to the other as a continuum. But, nowhere in Ayurveda does one find the concept of deathlessness of the body. Siddha, on the other hand, thinks of immorality of the physical body—a concept wholly alien to the general Indian ethos; for, the *Bhagavadgītā* asserts that one who is born is sure to die.

Siddha medicine is a belief system at its core, which tacitly accepts the presumed miraculous powers of mercury, sulphur and their combinations in promoting longevity and attaining immortality. The seed-ideas and practices of this system, it would appear, were in the nature of an implantation from the Chinese-culture area.

As noted before, the metallurgical (aurification) and elixir (immortality) alchemy had established itself in China around the third or fourth century A.D., though it had its origin there six or seven centuries earlier. In India, the *yoga sūtras* of Patañjali (about second century B.C) expounded the importance of intense meditation for the concentration of mind and the acquisition of mastery over the senses, regulated breathing and certain methods of psychosomatic symphony. Through these and with incessant penance, one could attain the status of a *yogi* and acquire extraordinary psychic or superhuman powers. One of the *Yoga sūtras* refers to certain pathways towards this goal, one of which is also by taking in potent herbs or drugs , thus implying the role of what may be called 'herb' or 'pill' in the acquisition of the supernatural eight *siddhis* and the elevation of a human to superhuman or Siddha.

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Tāntrik milieu

In India, Yogic practices of diverse nature were in course of time to become an integral part of Tāntrism. It was an esoteric milieu with a male-female imagery, rigorous meditational techniques, incantations of several types, concentration on and worship of ritual diagrams, some sexual practices symbolizing divine male-female union as well as the use of rejuvenating drug compositions. One, who firmly believed in tāntrik practices, irrespective of his caste, creed or sex, meticulously endeavoured to lead what he perceived would be a disease-free long life with superhuman powers. By about the fourth century, yoga and tāntrism became inseparable and the orthodox social rigidity showed signs of its loosening in the matrix of tāntrism. It was in this social flexibility that the core ideas of Chinese alchemy, its cinnabar and other elixirs as well as the so-called transmutation of base metals into gold, percolated into the tāntrik segments of Indian society through a transmission in which some Chinese and Buddhist monks possibly played a pivotal role. But, in the succeeding century or two, these core ideas were Indianized, as it were, inasmuch as *mercury* was regarded as the creative principle of *Śiva* and *sulphur*, that of his consort, Pāravatī or Gaurī (*Śakti)*. Indian alchemy even emerged as a dialogue between Śiva and Śakti—a cult that gave credence to alchemy and its off-shoot, the *rasaśāstra* (Sanskrit tradition) and the *Siddha* (Tamilian tradition).

In Indian ethos, a divine origin attributed to any type of practice had, then as now, an irresistible appeal to the common people. Moreover, a yogi or a person who is constantly immersed in intense meditation or spiritual pursuit, has a respectable position in Indian society. Siddhas were yogis, and were held in high esteem. Though they were non-conformists in their initial stages, they subscribed in a way to the Śaiva religio-philosophy. *Mercury* and *Sulphur* were, therefore, regarded by them as being divine male and female principles. In fact, their combination, mercuric sulphide, was referred to as *liṅgaṃ* (an appelation for Śiva), in which (phallic) form he was worshipped for the success of their alchemical or iatro-chemical pursuits. In the *rasaśāstra* texts, mercuric sulphide is called the *rasaliṅga*, representing the male-female union or a communion with the divine. Such esoteric dimensions apart, the Siddhas were devoted experimentalists who, in course of time, developed various medicinal formulations involving mercury, sulphur, arsenical substances, metals and minerals including gems as well as several plant and animal products, which constituted the Siddha medicine—a living therapeutic tradition in Tamil Nadu.

The Literature

A remarkable aspect of Siddha medicine is its literature, albeit its being entirely in Tamil. Its counterpart in Sanskrit, the texts of the *rasaśāstra,* appear to be a tenth of the Tamil texts, which are about 700. Not a few of them, however, have alchemical or religio-philosophical nuances. Even so, the medicinal chemistry or iatro-chemical aspects have a prominent position in these texts. It is rather surprising that either the Tamil scholars or Siddha practitioners have not turned their attention towards the translation of the major

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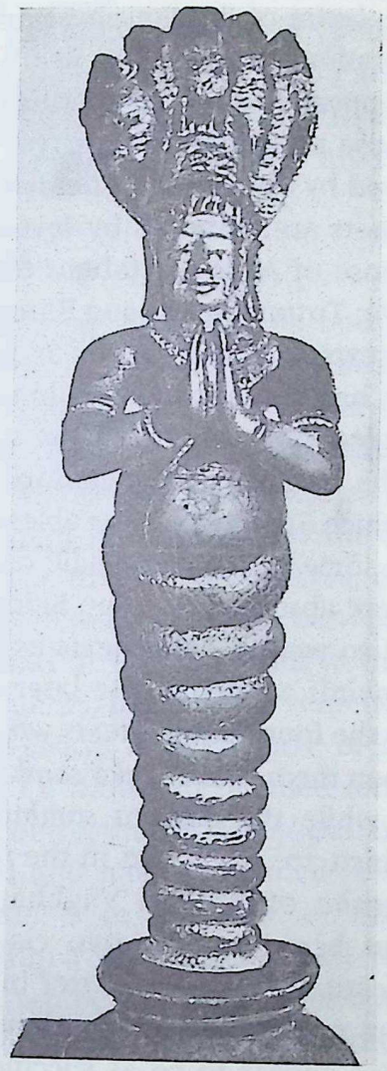
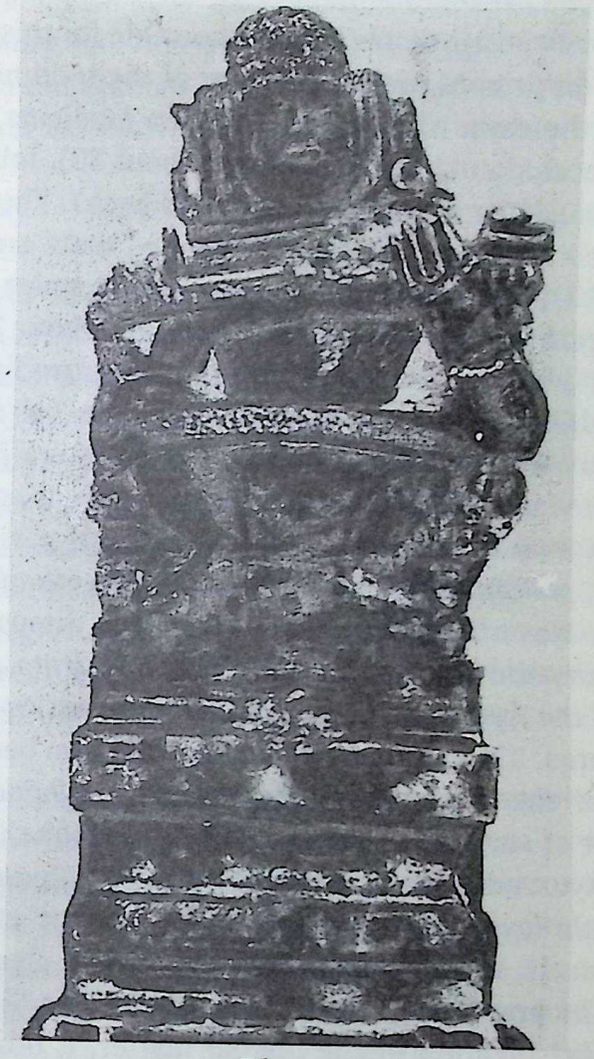


Patañjali
Śiva Temple, Thanjavur



Bhogar
Palaṇi Temple (Tamil Nadu)

A Siddha practitioner (near Madurai, Tamil Nadu) preparing a medicinal composition.

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Siddha texts into English so far. Perhaps the enigmatic contents of the texts with symbolic expressions on the one hand and, on the other, the desire of Siddha physicians to keep their secrets, might have been responsible for this situation. Nevertheless, nearly 200 texts have been printed, although many of them do not appear to have been critically edited.

In the extant literature of Siddha medicine, those attributed to Agastyar are about 170, Macchaimuni (35), Nandīsar (about 30), followed by Bhogar and Theraier (25 each) and Rāmadevar and Chaṭṭaimuni (20 each). The others are authored by several Siddhas and their followers. Among the printed texts are those of Agastyar (about 65); Maccha muni (13); Nandīsar (10); Bhogar (10); Theraier (12); Tirumūlar (8) and Rāmadevar (4). It is significant to observe that there are about 20 texts in Tamil, of which Thanvantari (Dhanvantari) is the author, and Tamilian tradition has also accorded to him the status of a Siddha. But, in the near absence of major surgical practices in Siddha system, it is doubtful whether the Tamilian Thanvantari is the same as Dhanvantari, who was associated with the surgical school of Ayurveda, of which Suśruta was the ablest exponent. Be that as it may, perhaps in the medieval period, some of the Ayurvedic concepts like *tridoṣa*, *pañcamahābūtas*, *rasas* and a few others were absorbed into the Siddha medical system. Nevertheless, they have not been discussed so well in Tamil texts as they are in the Ayurvedic classics, the *Caraka* and *Suśruta Saṃhitās* as well as the later texts.

In the Ayurvedic literature, the two classics are the foundational texts which are well delineated. Though there is much in common between them, the *Caraka saṃhitā* presents more of the therapeutic side (*cikitsā pradhāna)*, while the *Suśruta saṃhitā* gives an account of surgical operations (*śalya pradhāna)*, which are not found in the former. The later Ayurvedic texts including the *Aṣṭāṅgasaṅgraha* of Vṛddha Vāgbhaṭa and the *Aṣṭāṅgahṛdaya* of Vāgbhaṭa are to a great extent based on the two classics. More importantly, many of these texts have clear classification of subject matter in relation to the eight branches of Ayurveda . As for the Siddha medical literature, though there is some classification of the textual matter, it does not appear to be as succinct as in the Ayurvedic texts.

Of the important texts of Siddha medicine, special mention needs to be made of the following: *Amrutakalai jñanaṃ (1200); Auṣadha sāraṃ (500); Ayurvedaṃ (1200); Basmam (50); Centhrūram sūtraṃ (36); Gurunāḍī (100); Jalatiraṭṭu (1200); Karisāl (300), Karukkādai (500), Karpaṃ (500), Kāyasiddhi valalai (40), Māghatiruvagam (800), Mantherga Kaviyaṃ (1000); Nayana vidhi (500); Nāḍi (8000); Nādīnūlaṃ (200), Sūtraṃ (300); Tailasurukkaṃ (100); Vakāra mativenba (100), Vallādi (600), Vaidyaṃ (600); Vaidya Cintāmani (500) all of* **Agastyar**; *Ganaṃ (100); Karacaippa (500); Karukkādai (300); Pūraṇa caitya vaidyaṃ (1200) Vazhal (33)* and *Vaidya Sūtram (200)* all of **Nandīsar**; *Aṣṭakarmayogaṃ; Chikichai venba (100); Karpam (700), Karukkāḍai (500); Yeḷairam Kāṇḍaṃ (7000); Pādal (700), Sarukku vaippu (800)* and *Vaidyaṃ (700) of* **Bhogar**; *Yamaka venba (500), Vaidyaṃ (several works ranging from 200 to 1900 verses); Kappiaṃ (300); Karisāl (200)* and *Thailavarga surukkaṃ; of* **Theraier**; *Cigiccaisārasaṅgrahaṃ (500); Cintāmaṇi nidānaṃ (800), Karisāl (36); Kommi (1133); Madhi veṇba (120), Puranaṃ (100); Perunūl vaidya kāviaṃ (800) of* **Machha Muni**; *Karukkādal (600); Nāḍi-Anthadhi (53); Tirumantraṃ (3000); Vaidyaṃ* (six texts, verses ranging from 120 to 8000) *of* **Tirumūlar**; *Karukkádal sūttram (500); Vaidyaṃ (1500)* and

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Perunūl (500) of ***Rāmadevar;*** *Pdal* of ***Alukaṇṇi Siddhar*** *(61); Śarīram padal (69)* of ***Idaikkādar;*** and *Padal Karugnānaṃ* of ***Pāmbaṭṭi Siddhar*** *(70); Palathiraṭṭu (100)* of ***Karuvūrar;*** Vaidyaṃ of ***Kamalmuni*** *(300); Karuppaṃ kāṇḍaṃ (500)* and *Vādha Kāviyaṃ (3000)* of ***Konganaar;*** *Kāviyaṃ (1000), Vaidyaṃ (1500)* and *Vaidyaṃ Cintāmaṇi (10,000)* of ***Thanvantari;*** *Gānakarpam* of ***Pulasthar;*** and *Vaidyaṃ (500)* of ***Pulippāṇi.*** These texts have also their identity marks in terms of the number of verses contained in each, and the number mentioned in brackets after each text indicates its number of verses.

The Cakras

The Siddha concept of human body is by and large a tāntrik one in terms of what are called *cakras*. It is interesting to note that Siddha terminology in respect of the *cakras* is somewhat similar to that found in tāntrik texts in Sanskrit, with some variation. These *cakras,* are regarded as psycho-physical nerve centres, which are to be stimulated or roused by intense yogic practice so that the latent energy in the body and mind would become potent in more or less the same way as the rousing of *kuṇḍalinī* in the tāntrik parlance. The first of these *cakras*, called *mulādhāraṃ,* is supposed to be situated at the base of the spinal column, in between the anal orifice and the genital. It is believed that goddess *Śakti* or *Kuṇḍalinī* lies in this region, and it should be energized to move up to the other *cakras*, like a rising serpent, eventually to the seventh place i.e., from the centre of the eye-brows to the centre of cerebrum—a region which is supposed to have the structure of a thousand petalled lotus.

The centre, called *svādhiṣṭhānam,* is supposed to be located in the region between the gential and naval, regarded to be in the form of a lotus with six petals, while the *mūlādhāraṃ* is in the form of four petals. Higher up is the next *cakra* called the *maṇipūragaṃ* (Sans: *maṇipūraṃ)* in the naval-lumbar centre, its form being that of a lotus with ten petals. In the region of the heart is supposed to be situated the *anāhataṃ* (12 petals), and in the region of throat and at the junction of spinal column and medulla oblongata is *viśuddhi* (16 petals). The last one in the ladder is known as *ājña* (wisdom or will power) located in between the eye-brows. The *kuṇḍalinī* has to be energized and made to ascend and reach the blissful structure of a thousand petaled lotus! At this stage, there is a tacit belief that there would be the divine union of Śiva and Śakti and the so-called 'nitai' (nectar) drops into the blood stream leading to 'deathlessness'—the ultimate goal of a Siddha or any one who is desirous of attaining immortality, central of which is the intense yogic practice, specially regulated breathing. According to Yūgimuni, one of the later Siddhas, 21,600 respirations a day is the secret of remaining ever young, i.e., one respiration every four seconds.

Siddha system does not have an anatomy based on any observation, but has an unquestionable faith in a 'tāntrik body'. It believes that human body, in its physical and subtle states, is composed of 72,000 veins and nerves, seven vital nerve centres as stated above, 10 vital airs (*prāṇa)* and ten vital pulses (*nāḍī)*. Of the last, three are of tantric position, namely, *Iḍā, Piṅgalai* and *Suzhumnai* (Sans: *Suṣumnā).*

The control of *prāṇa* refers to an intensely practised regulated breathing. Tirumūlar has discussed this aspect in detail in his *Tirumantiraṃ*. According to him, the total

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number of respirations (21,600 in 24 hours) needed for the seven centres of the body is as follows: *mūlādhāra:6000; svādhiṣṭhan:6000; manipuragam:600; anāhatam: 6000; visúddhi:1000; ajña:1000;* and cerebrum (blissful state):1000. The two passages of nose, the left and the right, are symbolically related to the Moon and the Sun respectively, and the whole process of breathing is sought to be explained in terms of the energy of *prāṇa,* its regulation having a decisive influence on the control of mind. The anatomical foundations of Siddha system, therefore, are more in the realm of *yogic* tāntrism in sharp contrast to those of Áyurveda, where it is based on some direct observations, certain physical principles, including the *pañcamahābhūtas* which, in turn, are related to the philosophy of *Sāṅkhya, Vaiśeṣika* and *Nyāya*. Yoga philosophy, then, is a source of inspiration for Siddha system.

The *pañcabhūtas*, (five elements), according to Siddha, are related to the six *cakras*. The Siddha text, *Yūgimunivar vaidya cintāmaṇi* has some details in this regard as follows: *nela (pṛthvī)* is the base for *mulādhāra; nir(ap) - maṇipūraka;* thi (*tejas) - anāhata;* vali *(vāyu) - viśuddhi; viśumbu (ākāśa) - ajña.* The words in brackets are the Sanskrit ones. This relation is also conceived in a tāntrik framework along with what are called *bīja mantras* (seminal incantations). The *bīja mantra* for *nela* is *naṃ; nir - maṃ; thi - siṃ; vali - vaṃ* and *viśambu* -yaṃ. Even some gods were associated with these elements in an esoteric manner. The Siddha concept of *pañcamahābhūtas* is totally at variance with that of Áyurveda, which projects a rationale for certain physiological aspects based on the *pañcamahābhūtas*.

Siddha system enumerates five *āśayas* (physiological locations), namely, *āmāśaya, pakvāśaya, jalāśaya, malāśaya* and *śukrāśaya*, corresponding to stomach, small intestines, kidney, large intestines and genitals. But a detailed description of the digestive and metabolic activities occuring in them is but scanty. Besides, the Upaniṣadic concept of five *kośas* (*annamaya, prāṇamaya, manomaya, vijñānamaya* and *ānanda maya)* has also been interwoven in the context of human body and mind. It should be noted that Siddha terminology in this context is that of *Upaniṣads.*

Diagnostic methods

Pulse examination: Siddha system follows the *tridoṣa* concept of Ayurveda as well as its *pañcamahābhūta* (five basic elements: *pṛthvī, ap, tejas, vāyu* and *ākāśa*) doctrine. However, the Tamil texts are not, in this respect, as methodical and detailed as they are in Ayurvedic ones. The Ayurveda classics, the *Caraka* and *Suśruta saṃhitās*, do not attach much importance to the examination of pulse, unlike the later Ayurvedic texts of the medieval period. On the other hand, Siddha system accords a pride of place to pulse examination as a diagnostic method. Perhaps this method found its way into Ayurvedic practice influenced by Siddha system.

By the word, pulse or *nāḍī*, is meant the beating or throbbing on the radiant artery felt by the tip of finger(s) suitably positioned at the wrist. As a natural diagnostic medium, the rate and character of the pulse of a patient are expected to indicate a person's condition of health. In Ayurveda as well as in Siddha, pulse examination is

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related to *tridoṣas*. The character of the pulse movement and, through it of the disease of a patient, is sought to be identified in terms of *tridoṣas*. If the pulse movement is felt by the forefinger as being similar to that of a fowl, the disease is recognized as being due to *vāta*; if it is similar to that of a frog (felt by the middle finger), the disease is due to *pitta*; that of snake (ring finger), the ailment is understood as being due to *kapha*. According to Theraier, the movement of pulse in vitiated conditions of *vāta*, *pitta* and *kapha* would be that of swan or peacock, hen or ant, and fly or vulture, respectively. In any case, it is the experience as well as intuition of a traditional Siddha physician, or Ayurvedic vaidya, that would count in the matter of an effective pulse-reading. In addition, according to Siddha practitioners, a physician should also have spiritual experience gained by yogic practices, as that would enable him to examine the pulse accurately, and that would also help him in prognosis. The pulse examination, both in Siddha and Ayurveda, is intended to determine not only the nature of diseases—either due to *vāta*, *pitta* or *kapha*, or a combination of any two or three together—but also to have an insight into the curability or incurability of a disease.

Tirumūlar states that the inter-penetrating actions of ten vital airs (*prāṇa*), the six *cakras*, three nerve-channels (*Iḍā*, *Piṅgalā* and *Śuṣumnā*), and the three regions of body named by him as representing the Sun, the Moon and Fire, are also to be visualized by a Siddha through his spiritual insight, while examining the pulse-waves of a patient.

Urine examination: Urine examination, too, is a Siddha diagnostic method, by which generally the intensity of a disease is found out on the basis of its colour. A yellow or honey-coloured urine of a patient would indicate that the disease would be curable, while if it is ruby-coloured or milky white, the disease is believed to be incurable.

The common method of urine examination is to make a drop of sesamum oil fall on to the patient's urine from a height of 8-9 cm and observe its spreading: if it spreads in a longitudinal way, the disease is regarded as being due to *vāta;* if it assumes a circular from, the ailment is caused by *pitta*; no spreading means that it is due to *kapha*; and if it elongates and also spreads in a coil form, the conclusion is that the disease is due to *vāta and pitta* both. If, on the other-hand, the oil drop sinks, the affliction is of *sannipāta*.

Methodical questioning of a patient leading to a proper understanding of the history of a patient's disease, examination of his eye, fecal matter, colour, and the nature of skin and tongue as well as some astrological aspects concerning his time of arrival at the physician's house and the planetary configurations at that time, are also a part of Siddha diagnosis—a complex approach involving not only the rational, but also the irrational if viewed from a different standpoint. The spiritual prowess of a Siddha physician, who is to be a yogi, tāntrik and astrologer rolled into one, is also an important factor for the success of Siddha medicine.

Therapeutic principles

Adjuvants: Before we consider the nature and the types of Siddha drugs, it is desirable, indeed necessary, to understand two important aspects of Siddha therapy, namely, adjuvant (*anupānaṃ*) and dietary regimen (*pathyaṃ*). Both are Sanskrit words, which are

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also elaborated upon in Ayurvedic works. The number of Siddha drugs is not very large, the main reason for this being that a Siddha practitioner claims that he can cure several ailments even with a single drug by changing the adjuvant depending upon the nature of the ailment and by prescribing a suitable dietary regimen. For example, a drug called *Kauri cintāmaṇi cendūraṃ* consists of specially-processed mercury, sulphur and borax, each of 35g, as per the directions given in *Agastyar vaidya kāvyaṃ*. It could be used for curing a variety of diseases—with three pungent (*triphalā* or three myrobalans) powders as an adjuvant, this drug is stated to be efficacious against chronic fevers, rheumatism, colic, bronchitis, dysponoea, tuberculosis, skin diseases and hepatitis; with nutmeg, mace and cloves as adjuvants, it can be used for curing diarrhoea, indigestion and stomach ache; with another adjuvant called *Karuṇai lehyaṃ*, it can be used for curing piles and fistula; with the juice of *Calotropis* leaves, it can induce purgation. During this drug treatment, the diet restrictions are that the intake of salt should be minimum, but goat's milk and mutton could be taken. In Siddha system, therefore, an adjuvant is a supporting drug or a concurrent therapy, which has a synergic action. In other words, Siddha therapy is regarded as complete and effective only when a prescribed drug is administered with a carefully chosen adjuvant. The choice of an adjuvant for curing a well-diagnosed ailment must have been arrived at by prolonged and careful observation, and by trial and error method. In addition, the adjuvant has to be in tune with the seasons. For example, if a rejuvenating drug is made of chebulic myrobalans, its adjuvant in the rainy season is to be rock salt; in autumn, sugar; in winter, long pepper; in spring, honey, and sugar syrup in summer. This approach is similar to Ayurvedic practices, which are also concerned with the pharmaco-dynamics of adjuvants.

An adjuvant can be in the form of decoction, syrup or semi-solid or liquid form generally pleasant to taste, specially if the medicine to be swallowed is bitter or unpalatable. *Ghee* (clarified butter), butter, honey, herbal extracts, betel leaf juice, hot water, cow's milk, and a few others are also used as adjuvants. Theraier, while pointing out that an adjuvant potentiates a drug, emphasizes that a Siddha physician should be very careful in selecting an adjuvant in terms of its compatibility with the drug used.

The dietary regimen for a patient has also been dealt with in some of the Siddha texts like *Theraier veṇba* and *Theraier yamaga veṇba* in a way similar to that found in Ayurvedic texts, which do not think that food is different from a drug. There is a popular saying in Tamil: *unava marunthu; marunthe unavu*, which means that 'diet itself is medicine and medicine itself is diet'. Siddha therapy stresses that proper diet of a patient helps him not only in the efficacy of drug action, but also in the preservation or nurture of such action within the body. Improper diet, on the other hand, will undo the effect of a drug, besides complicating the very curative process.

Apart from the prescribed diet restriction during the period of treatment, there are general dietary restrictions for all the medicines, like avoiding the intake of tamarind, jaggery, pulses like greengram and bengalgram, buttermilk and betel-chewing. In addition, for certain diseases, there are specific diet restrictions like curd should be avoided if a patient has eye or skin disease, jaundice, indigestion, diarrhoea, fever, rhinitis and anaemia. In the opinion of some Siddha physicians, it is essential 'to have standard

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prescription of diet and medicine. Intensive scientific work should be carried out to ensure more comfort to the patient and to get an optimum effect and to formulate a good line of treatment.

Muppu and other salts

A notable characteristic of Siddha medicine is its concept of what may be called 'Universal Salt', which is known as *muppu* (lit: union of three salts). Regarded as *prima materia*, it has been hailed in Siddha system as one substance capable of (i) transmuting base metals into gold (*vāda muppu)*; (ii) rejuvenating cellular organisms, besides engendering the efficacy of medicines, when added to them (*vaidya muppu)*; (iii) augmenting yogic concentration (*yoga muppu);* and (iv) leading to enlightenment (*jñāna muppu*). In Siddha medicine, *muppu* occupies a distinct position in *Kāya Kalpa* (which is discussed below), as well as in potentiating medicines. For this reason, Siddha tradition advocates the addition of small quantities of *muppu* to any medicine before it is administered. But its preparation is a closely guarded secret of Siddha practitioners, each being by and large unaware of the process adopted by the other. According to some Siddha texts, the first prayer offered by a Siddha is to invoke the blessings of Śakti-Śiva, the two-in-one Lord of the Universe, for the bestowal of the knowledge of *muppu*. There seem to be more than 40 processes for *muppu* described in Siddha medical literature, but so enigmatically that each process is shrouded in mystery.

Nevertheless it is generally pointed out by a majority of Siddha practitioners that *muppu* consists of three salts: (i) *pūnīru* (a natural exudate from the soil which has Fuller's earth); (ii) *kalluppu* (either rock-salt or sea-salt); and (iii) *veḍiyuppu* (naturally available potassium nitrate). Their processing, however, either individually or together, leading to *muppu* as universal, salt according to Siddhas, is also a secret. It would appear that the three salts are purified with sacred river water as well as the juices of certain plants, and calcined or subjected to the action of prolonged heating. Small quantities of mercury, its chlorides, sulphur, mica, arsenic sulphides, and other minerals, are also subjected to calcination separately and the resultant powdery product is added to the already calcined three salts, to obtain *muppu* which, with specially processed gold powder or its thin foils, is extolled as the 'elixir of life'.

Pūnīr is an important component of *muppu*. It has a composition similar to that of Fuller's earth (over 50% of silica, 13% of aluminium oxide, about 10% of iron (ferric) oxide, 5% of calcium oxide, 2% of magnesium oxide, less than 2% of alkalis, and 18% of water). Even now, this is collected ritualistically in certain places of Tamil Nadu by Siddha practitioners, specially on four full-moon nights in the months of Jan-April. *Pūnīr* itself is used in some medicinal preparations, but its role in *muppu* is seminal. According to some Siddha practitioners who collect it, they should offer worship to the soil from which it emanates.

The common salt (sodium chloride), derived from sea-water, is also considered as very important in *Kāya Kalpa*. In this form, however, it is abhorred to be taken in, and hence it is diligently processed to remove its deleterious effects. The recipe for this

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process is also kept as secret. Called the *kaṭṭuppu* (lit: consolidated or bound salt), this type of processed salt, it is believed, would not melt by the action of fire, nor would it dissolve in water, but become as 'hard as ivory'.

Kāya Kalpa

In pursuance of its avowed objective of making the human body everlasting with robust health and strength, Siddha system accords a pre-eminent position to *kāya kalpa*—an intricate conditioning or revitalization of both the body and mind by adopting several procedures. These are intended not only to rejuvenate the body, but also to maintain it in a youthful state over a long span of life. Towards this goal, Siddha system advocates: (i) yogic *prāṇāyāma,* which would lead to the preservation of vital energy of the body in the blood stream; (ii) conservation of sperm or reproductive essence; (iii) the use of *muppu;* (iv) intake of specially prepared but calcined powders of metals and minerals, like mercury and its compounds, sulphur, mica, gold and copper; and (v) the administration of drugs prepared from chosen herbs. Siddha practitioners believe that the first three methods can be adopted only by yogis and have the capability of making their bodies immortal, while the other two would lead to the prolongation of the life-span of ordinary people. Plants have a special role in respect of the latter.

It has been emphasized by the exponents of Siddha system that, if a person undergoes *kāya kalpa* at his age of thirty, he would continue to remain rejuvenated as a young boy of sixteen; and at seventy, as a young man of twenty; and beyond seventy, rejuvenation through *kāya kalpa* is rather difficult.

Two of the eight branches of Ayurveda—The *Rasāyana* and the *Vajīkjāraṇa*—have similar goal to that of *kāya kalpa* of Siddha. However, there are two important differences between the two systems: (i) Ayurveda defines life as the union of body, senses, mind and soul, and accepts the position that soul is immortal, while body is ultimately perishable, but its life-span can be prolonged. Siddha, on the other hand, does not attach much importance to soul, and believes that body itself can be made immortal; and (ii) in the *rasāyana* and *vājīkaraṇa* treatments, chosen potent herbs are generally employed, while Siddha *kāya kalpa* encompasses intense yogic *prāṇāyāma,* mercurial and other metallic as well as mineral drugs, besides certain herbs and the tāntrik approach in terms of rousing *kuṇḍalinī* and related practices for the secretion of '*amṛtam*' (nectar) to attain longevity or even immortal state.

According to Siddha Sattaimuni (quoted by Velan, pp.134 139), the *kāya kalpa* processes are as follows (some of the plants used in this treatment have not been identified botanically):

(i) Cleansing the throat by eliminating the mucus: this is carried out by brushing up the uvula and around the tonsil with a paste prepared from the plant, *Eclipta alba* and *ghee*; the operation to be carried out each day, once early in the morning for a period of 40 days;

(ii) Cleansing the bowels through evacuation of feces and the lubrication of rectal mucosa by enema: generally the extract of *Aloe indica* mixed with castor oil is used

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for this purpose; a decoction of myrobalan (*Terminalia chebula*) is administered as a mild laxative for a person having constipation; sometimes a preparation from a chosen plant and myrobalans is also used for this purpose. As for the myrobalans, they are to be powdered and taken with jaggery in June-July; with sugar in November; with a decoction of ginger in December-January; with honey in February-March; and with what is called *amuri* during April-May;

(iii) Intake of black pepper every day—five in number with *amuri* or any other adjuvant, but the number to be increased by five in the succeeding days till one hundred pepper grains are consumed;

(iv) To remove the deleterious effects of the *tridoṣas*, a fine powder of the prescribed variety of a basal plant (either *Sphaeranthus indicus, Sphaeranthus hirtus* or *Sphaeracanthus zeylanicus*) with powder sugar (4:1) is to be prepared, and about 20 grains in weight of this mixture is to be taken twice a day with honey, for 40 days;

(v) To invigorate the nervous system and the connective tissues as well as to improve the functions and colour of the skin, a fine powder of the bark of a very old neem tree is to be soaked in the juice of *Abrus precatorins* and sun-dried. This operation is to be repeated several times, and the powder thus processed and mixed with sugar, is to be taken—20 grains in weight twice a day, for 40 days;

(vi) In order to expel excess fat from the body and to tone up muscular system as well as to remove gas from stomach and phlegm from the respiratory system, a thick syrup prepared by boiling (over a slow fire) the juices of equal quantities of *Eclipta prostrata* and two other plant juices is to be taken with honey—20 grains in weight twice a day, for 20 days;

(vii) To accomplish what is called the *dhātu śuddhi* (purifying the three *dhātus*) and to make the body free from *kapha* as well as to expel vitiated *pitta,* equal quantities of the dry roots of *Indigofera aspalathoidas* and the seeds of *Celastrus panniculatus* are to be powdered, and their oil is to be extracted. To this oil are to be added cumin seeds and powdered sugar, and thoroughly mixed; 5 grains in weight of this mixture twice a day for 40 days, are to be taken;

(viii) To increase appetite and sexual power as well as to improve digestive capacity and stimulate muscular tissues, sweating, urination and the action of bile, a fine powder each of eight herbs including the roots of *Plumbago zeylancia,* seeds of *Calastus panniculatus,* and the flowers of *Cassia fistula,* are to be prepared from equal quantities of each, and 14 grains in weight twice a day to be taken with *ghee* for 40 days;

(ix) To invigorate the genito-endocrine system, half of egg (of a black fowl) a day is to be taken for 20 days, after the egg is kept in a pot and buried in a heap of rock salt for 2 months, and later boiled in the juice of a prescribed plant.

Medicinal oil bath forms a part of *kāya kalpa*. For this purpose, the rhizomes of *Curcuma aromatica*, fruits of *Emblica officinalis*, seeds of *Azadirachta indica,* black pepper and the fruits of *Termanalia chebula* are ground well in cow's milk to form a paste. This paste is boiled over mild fire, stirring it constantly. To this is added some quantity of fresh

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butter, and mixed thoroughly. The resulting fatty paste is applied to the body from head to foot before taking bath, twice a week.

Apart from the plant products, the *kalpa* drugs of Siddha system include several metallic or mineral compounds, either singly or in combination. Specially processed mercury and mercuric sulphide have pride of place among them as the most potent in *kāya kalpa*. Purified or 'consolidated' mercury (*liṅgakaṭṭu*) is believed to have extraordinary effects. Even if it is worn ritualistically as an amulet, it is supposed to rejuvenate the entire body and, if used along with other *kalpa* drugs, it can potentiate the latter for curing malignant and degenerative diseases.

Siddha system has implicit faith in *kāya kalpa* as the most beneficial treatment for energizing the body, both physically and mentally almost in an ever-lasting manner. The diet in the course of this treatment, is to be without unprocessed common salt, sour articles like tamarind, fish, meat, and several other food stuffs of pungent nature. Besides, sexual intercourse is to be avoided during the *kāya kalpa* treatment, and a disciplined daily routine is to be adhered to.

Plants

A notable aspect of *kāya kalpa*, in particular, and of Siddha tradition in general, is the role in it of certain types of plants. According to Siddha practitioners of today, almost all the herbs mentioned in the original works of Siddhas are of rare kind, and one has to find them with great care in certain parts of hills like Podigai hills (Tirunelveli, Tamil Nadu), Koli hills (Salem) and seven hills (Tirupati). Their proper identification, however, is rather difficult, but has to be learnt from the traditional knowledge which is not easy to obtain since there are variations from one tradition to the other, besides their veil of secrecy. However, as a result of recent efforts of the Council of Research in Ayurveda and Siddha, several plants have been identified botanically.

Although each Siddha is stated to have considered a single plant as the most potent one, those which are regarded as the most effective for *kāya kalpa* among the recognized plants for use for this treatment are (Tamil words in brackets): an aquatic plant, *Cyprus rotundus* (*Korai* kilangu); *Aloe indica* (Katralai); *Phylanthus niruri* (Kilanellai), bel (Vilvam); *Ecipta alba* (Karishalai); *Ginjiber officinalis* (inji); and neem; *Asparagus* (Vittan kilaṅgu); *Withania somnifera* (Amkkura kilangu); *Alterananthera sessilis* (Ponnangani); *Chebulic myrobalan* (Kādukkai); Indian gooseberry (nellikai); bottle gourd (Suraikai); *Boerhaavia diffusa* (Mōtkraṭṭai); basil (tulasī); *Myristica officinalis* (Sathikai); cloves, pepper and cumin seeds. In any case, in the preparation of Siddha drugs, a large number of plants are employed even when metallic and mineral drugs are to be prepared. A list of plants is given in Appendix I.

Drugs

Siddha Pharmacopoeia (in Tamil) prepared under the auspices of the Ministry of Health and Family Welfare, Government of India, consists of 242 drug compositions. The

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Formulary of Siddha Medicines, published by the Indian Medical Practitioners Cooperative Pharmacy and Stores, (Chennai) contains about 220 preparations. They can be broadly classified into: (i) incinerated fine providers of reddish colour (*centhūraṃ);* (ii) certain plant products in powdery or tablet form (*cūrṇaṃ)*; (iii) calcined powders of metals, calcium compounds, saltpeter and/or marine shells (*cūnnaṃ)*; (iv) preparations of metals with mercurials (*kalaṅgu)*; (v) rejuvenating elixirs *(karpaṃ)*; (iv) black-coloured compositions (*karuppu)*, generally prepared from black sulphide of mercury and other ingredients; (vii) pills (*mātharaiṃ kuligai)* containing specific plant products with or without some minerals or mercuric compounds; (viii) linctuses (*lehyam)*; (ix) semi-soild or liquid forms (*melagu*) or *kulambu* prepared from some plant products, minerals with or without mercury or sulphur; (x) medicated syrups (*mānappāgu)*; (xi) fine powders (*parpaṃ),* obtained by prolonged heating of compositions of chosen plant products, shells and salts or mercury and other metallic compounds; (xii) sublimated products (*pataṅgaṃ)*; (xiii) medicated oils (*tailaṃ*); and (xiv) distilled compounds (*tirāvakaṃ)*. In order to have an insight into their methods of preparation and their uses as curative agents, some illustrative drugs have been given below, based on a few original texts and the *Siddha Pharmacopoeia* (SP).

(a) *Abhīraka centhūraṃ* (mica product): 'Grind purified mercury with sufficient quantity of *pugai* nir (a special type of water) and dry it in sun when it results in the form of a white powder (*rasa bhasmaṃ)*. Take purified mica powder (35g.) and its 1/4 by weight of *vīraṃ* (mercuric chloride); grind them well in *pūgai nīr* and dry it. Seal this product in an earthen pot and subject it to prolonged heating over burning cow-dung cakes. After it cools, take the content, add to it *aridāra* (arsenic compound), and grind the mixture again using *pūgai nīr* for six hours, make cakes out of it and dry them in sun. Repeat the process, grind it, and obtain a red coloured powder. Take two parts of this powder and one part of *rasa bhasma*, (mercuric sulphide), grind them in *pugai nīr* again and prepare *centhūraṃ* by *Kūpi pakva* method (a type of glass apparatus). This could be administered in very small quantity with honey for curing *vāta* diseases, pain, phlegm disorders or even polio' (*Agastyar Paḷḷu*—verses 41-43).

(b) *Mayilirakādi cūrṇaṃ* (ash of peacock feather): 'Grind and make a powder of pepper with ten parts of cumin seeds and make an ash of peacock feathers. To this add the ash of peacock feather and grind well. About half to one gramme of this with honey is to be given for curing hiccup' (SP.61).

(c) *Tāmbira cunnaṃ* (calcined powder of copper): 'Grind carefully purified *singi* (lead monoxide), copper filings and mercuric chloride (*vīraṃ*) in the ratio of one, half and 1/4 *palaṃ* (about 35g.), respectively, in the juice of a variety of *tulasī (Ocimum basilicum*) for three days to a thick consistency. Make small cakes, dry them in sun and calcine them in a pot by heating it over the fire of 40 cow-dung cakes. Repeat the process six times, and obtain *tāmbira cunnaṃ* as a fine powder'. Administration of one grain in weight of this with cow's *ghee* for 40 days cures dermal disorder and even tuberculosis. During the treatment, the diet should be free from tamarind and other sour substances (Thyagarajan (3), p.43.)

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(d) *Vilva phala karpaṃ* (*bel* fruit and mercurial compound) : 'Collect the fruit rind of *bel*, dry it in sun and extract its oily portion. Place some mercury in an iron pan and add this oil to it little by little, while the pan is being heated. This operation is continued till mercury becomes 'bound'. Mercury, thus processed, should be converted into its *centhūraṃ* (by the prescribed process). If this is taken with the *bel* oil for 48 days, one can get rid of grey hairs and premature old age' (Bhogar, *Mudalāyiraṃ*, verses 496 and 497).

(e) *Paṭṭu karuppu* (a combination of mercuric compounds and some minerals): 'Take purified mercuric sulphide (one *palam*: about 35g.), mercury (17.5g.); mercuric per chloride (17.5g.), white arsenic (17.5g.); load stone (iron oxide, 17.5g.); black aconite (17.5g.), and cloves (8.5g.). Grind them together well into a fine powder. Mix this powder with castor oil (35g.), and make the resulting mass into a ball or round form. Cover this with a paste of *Citramūla* (a plant; 280g.) and encase it in a silk cloth. Place this in a pot, seal it tight, place the pot on a sand-bath, and subject it to prolonged heating over the fire of 50 cow-dung cakes. After the material cools, take the product out and powder it. If about 50 g. of this is administered with honey, diseases like leucorrhoea, fever and dysmenorrhea can be cured' (SP.100).

(f) *Kesari lehyam* (a linctus): 'Take (i) lemon (100 nos), (ii) sugar (175g.), (iii) pepper (35g.), (iv) cumin seeds (35g.), and (v) *koṣṭaṃ*, (vi) ginger, (vii) *tālisapatrī*, (viii) *pippali*, (ix) nutmeg and (x) *jātipatri* (each about 4g.). Grind the materials (ii to x) to a powder form. Add lime juice extracted from 100 lime fruits, mix sugar with it, and heat the mixture over low fire and obtain a syrup. To this add the powdered drugs and *ghee* (175g.), and prepare the linctuse. If 3g. of this is taken every day two times, it will cure biliousness and indigestion'.

(g) *Kiḷinziḷ mezhagu* (from pearl oyster shell): 'Heat the required quantity of pearl oyster shells to the desired extent and put them into a specially prepared extract of Indian gooseberry. Heat this again and again (3 to 5 times), and finally grind the resultant material with castor oil. This preparation can be used for curing foot-cracks formed externally' (SP.88).

(h) *Śanka tirvākaṃ* (a distillate). 'Take potassium nitrate (*veḍiyuppu*: 3 parts), rock-salt (*inḍuppu: 2)*, common salt (*sotruppu: 1)*, ammonium chloride *(navacaraṃ: 2½)*, ferrous sulphate (*annabhedi: ¼)* copper sulphate (*turusi: ¼)*, (*paḍikāraṃ: 2½*), dhobi earth (*pūnīru*: ¾) and borax (*venkāraṃ:* 1). Grind them well into a fine powder. Obtain the *thirāvakaṃ* using distillation process. One drop of the distilled liquid with water is effective against chest pain, arthritis, and stomach ache' (SP. 75).

(i) *Kaiyaṃ tailaṃ* (an oil): Grind *Bhṛṅgarāj* (*Karīsalaicaru)* into a paste and mix it with sesamum oil in the proportion of 1:1. Heat the mixture till its water content is completely evaporated. If a patient suffering from cough takes ½ to one tea-spoon of this per day, his cough will be cured' (SP. 213).

There are several common remedies in Siddha system, too. These have been brought out by the Central Council for Research in Indian Medicine and Homeopathy (Ministry of Health and Family Planning, Government of India). They include simple preparations for

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the cure of general ailments like fever, headache, cough, pain all over the body, sore throat, nasal discharge, diarrhoea, indigestion and the like (*A Handbook*, 1987).

Apparatus

For the methodical preparation of drugs, several types of apparatus or contrivances were used then as now. They are somewhat similar in conception and practice similar to the Rasaśāstra ones.

Clinical trials

The Central Council for Research in Ayurveda and Siddha has been encouraging medical research in a scientific manner on chosen drugs, which have been described in the ancient Siddha texts. One such drug is called *Tāmbira cendūram* (calcined powder of a copper compound) which, according to Agastyar, is capable of curing peptic ulcer (*vāḷigunman)*. The symptoms of this disease have been described in detail in the works of Agastyar and other Siddhas. Its etiology was understood in terms of the derangement of metabolism in the stomach and duodenum leading to the malfunctioning of the gastric secretary process—a condition of vitiated *pitta*.

The traditional method of preparing *tāmbira cendūram* consists of soaking 100g. of copper filings in lime juice for 5 days, replenishing fresh lime juice every day after cleaning the filings with fresh water. On the sixth day, they are dried in sun. The filings thus processed or purified are ground in a mortar with the juice of *tulasī (Osimum sanctum)* to a fine consistency, made into small pellets, and kept in mud pans. These pans are then sealed with seven layers of mud plaster and subjected to prolonged heating in a *puṭa,* using about 100 dried cow-dung cakes as fuel. The process is repeated seven times, the material then taken out from the pans and finely powdered. The colour of the product, the *cendūraṃ*, will be slightly reddish black. The material used for the clinical trial was in the form of capsules, each containing about 43g. of *tāmbira cendūraṃ*, and the dose administered to a group of patients was one capsule each day before meal. The course of treatment was on alternate days or three courses in five days. During the period of rest on the sixth day, the patients suffering from peptic ulcer or its symptoms (mostly workers) were advised to take *omaṃ* bath, and on the seventh day, the cumin seeds oil-bath. The second course was started on the eighth day, and the third course on the 15th day. During the course of treatment, the patients were advised to take only bland diet in which there was no tamarind, chillies or other spices. The results proved positive cure in most of the cases, thus confirming that the traditional Siddha drug, *tāmbira cendūraṃ*, is effective against peptic ulcer.

Likewise, a combination of two Siddha drugs, *kut apalāipaṭṭai* and *paḍigalingathuvar*, has been clinically tested for its efficacy in the treatment of amoebic dysentery. The former is prepared mainly from the root bark of *Holarrheria anti-dysentrica*, and the latter from the purified red sulphide of mercury and alum along with some other ingredients.

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The administration of the two drugs has been found to have significant effect in combating the amoebic dysentery. Another Siddha herbal remedy, prepared from the leaves of *Ricinus communis,* has been assessed by both bio-chemical and clinical methods, and the results have confirmed the efficacy of this drug for curing rapidly even acute infectious hepatitis in one to two weeks.

The foregoing are but illustrative of the importance being given to a scientific examination of some Siddha drugs—a rational attempt to evaluate their efficacies as claimed in the traditional texts. It would, however, appear that such trials are few and far between. More systematic investigations in this direction are indeed necessary if Siddha drugs are to be preferred to their counterparts of modern medicine in the cure of chronic ailments like peptic ulcer, hepatitis, and others. It is heartening indeed that scientific endeavours are being made in the right direction.

During the five decades since Independence, the three traditional systems of medicine, Ayurveda, Unani and Siddha, have made considerable progress in respect of their education and training as well as their medicinal dispensation. The Government of Tamil Nadu, where Siddha medicines appeal to the common people, has been encouraging this system to a great extent, though Áyurvedic and Unani medicines are also in use. In Tamil Nadu, there are more than 100 Siddha hospitals and over 300 dispensaries, big and small. There are two medical colleges, exclusively for teaching Siddha medicine. The Thanjavur University has a Post-Graduate Department for teaching and research in this field. The total number of beds in the state for this indigenous system is more than 1100. Under the Indian Council of Research in Ayurveda and Siddha (the Siddha wing being located in Chennai), there are three units for drug standardization, clinical evaluation, and rearing of medicinal plants, besides two units for tribal health care and one mobile clinical research.

In 1978, the Central Council for Research in Indian Systems of Medicine prompted the preparation of a standarised Siddha formulary (still unpublished) comprising 242 drugs. Nearly 100 plants and with several inorganic as well as organic substances are involved in this formulary (see Appendix). This has helped a great deal in the production of standard Siddha medicines. Neverthless, several private pharmaceutical units (there are over 475 licensed Siddha pharmacies in Tamil Nadu) have been producing and marketing Siddha medicines, both at home and abroad, claiming that their medical formulations are derived from traditional texts. Among their products, those which are in the nature of rejuvenators and health-preservatives as well as a few others for curing certain chronic ailments are popular, generally among Tamilians. Hopefully, Siddha system might augment its potential in the near future towards the medicare of a large section of Tamilians.

By adopting a scientific approach in recent times, there has been a growing interest all over the world in traditional medicines of composite character. Indian traditional medicines have attracted the attention of several countries, both in the east and the west. More importantly, they are an integral part of the WHO aim: *Health for all by 2000 A.D.* India has been rightly promoting traditional systems of medicine along with modern (western) medicine with a view to making available the benefits of both to the people at large.

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APPENDIX I

Plants used in Siddha Medicine

Sl.No	*Name of the plant*	*Botancial name*
1	Aakasagarudan	*Corallocarpus epigynous Benth.*
2.	Aal	*Ficus bengalensis Linn.*
3.	Ali	*Linum usitatissimum Linn.*
4.	Ammanpaccharisi	*Euphorbia hirta Linn.*
5.	Ammuggura	*Withania somnifera Dunal*
6.	Avarai	*Cassia auriculata Linn.*
7.	Avuri	*Indigofera tincotoria Linn.*
8.	Alingi	*Alangium salvifolium Linn.*
9.	Sembarutti	*Gossypium arboreum Linn.*
10	Sevalli	*Rubia cordifolia Linn.*
11	Citramūla	*Plumbago indica Linn.*
12	Devadāru	*Plumbago zeylanica Linn. or Cedrus deodora Roxb.*
13	Lavaṅgapattai	*Cinnamomum zeylanicum Blume.*
14	Yetti	*Strychnos nux-vomica Linn.*
15	Impural	*Oldenlandia umbellat Linn.*
16	Satikai	*Myristica fragrans Houtt.*
17	Satipattiri	*Myristica fragrans*
18	Kadugu	*Brassica nigra Linn Koch.*
19	Kammaruvetrilai	*Piper betel Linn.*
20	Gantubharaṅgi	*Pymacopremma herbacea Moldenke*
21	Karandai	*Sphaeranthus indicus Linn.*
22	Karisalai	*Eclipta prostrata Roxb.*
23	Karkatakasrngi	*Rhus succedania Linn.*
24	Karbogarisi	*Psoralea Corylofolia Linn.*
25	Karunjirakam	*Nigella sativa or Carum copticum Linn.*
26	Karungali	*Acacia catechu Willd.*
27	Kasakasa	*Papaver sominferum Linn.*
28	Kattatti	*Woodfordia fruticosa Kurz.*
29	Kattumilagu	*Piper attenuatum Buch-Ham.*
30	Kalarchi	*Caesalpinia crista Linn.*

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31	Karambu	*Syaygium aromaticum Merr.*
32	Koraikilangu	*Cyperus rotundus Linn.*
33	Gorocanal	*Holarrhena antidysenterica Wall.*
34	Kudasapalai	*Crocus sativus Linn.*
35	Kumkum pū	*Abrus precatorius Linn.*
36	Kunri	*Coleus vetiverodies K.C.Jacob.*
37	Kuruver	*Mimusolps elengi Linn.*
38	Magilampu	*Gisekis pharmaceoides Linn.*
39	Manalikirai	*Curcuma longa Linn.*
40	Mañjal	*Rubia tinctorum Linn.*
41	Mañjatti	*Berberis aristata DC.*
42	Maramanjal	*Coccinium fenestratum Gert.*
43	Marukarai	*Randia dumetorum Lam.*
44	Marudam	*Terminalia arjuna W. &A.*
45	Marudonri	*Lawsonia inermis Linn.*
46	Milagaranai	*Toddelia asiat Lam.*
47	Musambaram	*Aloe barbadensis Mill.*
48	Nannari	*Hemidesmus indicus R.Br.*
49	Niradimuttu	*Ichyocarpus kurzii King Warp.*
50	Nirmulli	*Asteracantha longifolia Nees.*
51	Nel pori	*Oryza sativa Linn.*
52	Nilakumil	*Gmelina asiatica Linn.*
53	Nilavagai	*Cassia angustifolia Vahl.*
54	Nilavembu	*Andrographis paniculata Nees.*
55	Nilavila	*Feronia limonia Linn. Swingle*
56	Odiyam	*Launea grandis Tennst. Engl.*
57	Palasu	*Butea monsperma Lam O.Ktz.*
58	Panivellam	*Borassus flabelliformis Linn*
59	Parpatakam	*Mollugo perviana Ser.*
60	Peikumatti	*Citrullus colocynthes Schrad.*
61	Peipirku	*Luffa acutangula Linn Roxb.*
62	Peipudal	*Trichosanthes cucumerian Linn.*
63	Peramutti	*Payonia odorat Willd.*
64	Peruṅgayam	*Ferula foetida Boiss*
65	Piramivalukkai	*Bacopa monnieri Linn Pennell*
66	Ponnangani	*Alternanthera sessilis Linn.*
67	Púnaikali	*Mucuna pruriens Hook.*
68	Potralaikaiyan	*Wedelia calendulacea Less.*
69	Pulinaralai	*Cissus setosa Roxb.*
70	Puliyarai	*Oxalis cormiculata Linn.*
71	Sankan	*Azima tetracantha Lam.*
72	Sarakonrai	*Cassia fistula Lam.*
73	Sarakonrai	*Glinus lotoides Linn.*

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74	Siruseruppadai	*Gymnema sylyestres R.Br.*
75	Sirukurinjan	*Mesua ferrea Linn.*
76	Sirunagapu	*Dillenia pentagyna Roxb.*
77	Sirunerunjil	*Tribulus terrestris Linn.*
78	Sirutekku	*Clerodendron serratum Linn.*
79	Sivanarvembu	*Indigofera aspalathoidas Vhal.ex.DC.*
80	Talisapattri	*Taxus baccata Linn.*
81	Tetrankottai	*Strychnos potatorum Linn.*
82	Tuduvalai	*Solanum trilobatum Linn.*
83	Uddamani	*Porgularia excelsa N.E.Br.*
84	Umattam	*Datura metel Linn.*
85	Vayuvilangaṃ	*Embelia ribes Burm.f.*
86	Vailarai	*Centella asiatica Urban*
87	Vembu	*Accrus calamus Linn.*
88	Vellilodiraṃ	*Symplocos spicata Roxb.*
89	Vembu	*Azadirachta indica A.Juss.*
90	Venkadugu	*Brassica alba Boiss.*
91	Vetrilai	*Piper betel Linn.*
92	Vetpalarisi	*Wrightia tinctoria R.Br.*
93	Vettiver	*Vetiveria zizanoides Linn Nash.*
94	Vilangai	*Feonia limonia Linn Swingle*
95	Vilvam	*Aegle marmelos Correa*
96	Viludi	*Cadaba ferino Forsk*
97	Elarisi	*Elettaria cardommum Maton.*
98	Yanaitippili	*Piper retrofractum Vahl.*
99	Yellu	*Sesamum indicum Linn.*
100	Yerukku	*Calotropis gigantea R.Br.*

APPENDIX II

Metals, Minerals, Salts, and Animal products used in Siddha Medicine

Ulogam/Metals

1.	Ayaṃ	Iron
2.	Karu Vangaṃ	Lead
3.	Kānthaṃ	Lodestone (Magnetic oxide of Iron)
4.	Chembu	Copper
5.	Nāgaṃ	Zinc
6.	Tangaṃ	Gold
7.	Maṇḍūraṃ	Dross Iron (haematite ?)
8.	Velvangan	Tin
9.	Velli	Silver

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Panca Sootam

Mercury and its compounds

10	Erasaṃ	Mercury
11	Erasa Cendúraṃ	Red oxide of mercurry
12	Elingaṃ	Cinnabar (red sulphide of mercurry)
13	Pūram	Calomel (mercurous chloride) (?)
14	Vīraṃ	Corrosive sublimate of mercury or mercuric chloride

Patanangal

15	Anianakkal	Stibnite (antimony sulphide)
16	Gandakaṃ	Sulphur
17	Goauri	Arsenic pentasulphide
18	Tālakaṃ	Yellow orpiment (arsenic trisulphide)
19	Manośilai	Red orpiment (arsenic disulphide)
20	Mirudara singi	Litharge or massicot (lead monoxide)
21	Vellaippachanaṃ	White arsenic (Arsenic trioxide)

Karaśāram

22	Induppu	Rock salt
23	Yevatcāraṃ	Pottassium carbonate (crude)
24	Kadal nurai	(?)
25	Kalluppu	Common salt
26	Kariyuppu	(?)
27	Satthyccāraṃ	(?)
28	Paḍikāraṃ	Alum
29	Cūdan	Camphor
30	Navacāraṃ	Sal aminiac or ammonium chloride
31	Paccai Karpūraṃ	Borneo camphor
32	Bidalavaṇaṃ/Kampu	Salt/black salt (?)
33	Pūnīru	Dhobi's earth similar to Fuller's Earth
34	Ambar	Amber gragea
35	Vaḷayaḷuppu	(?)
36	Venkāram	Borax or sodium biborate
37	Veḍiyuppu	Saltpetre or potassium nitrate
40	Aṭṭuppu	(?)

Navamaṇi (nine gems)

41	Gomedhakam	Zircon
42	Neḷamaṇi	Saphire
43	Pavaḷham	Coral
44	Pushparāgaṃ	Topaz

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45	Markataṃ	Emerald
46	Mānnikkaṃ	Ruby
47	Muttu	Pearl
48	Vaiḍūriyam	Lapis lazuli
49	Vairaṃ	Diamond

Uparasam

50	Appirakam or Veḷḷai	Muscovite (white mica)
50(a)	Karuppu	Biotite (black mica)
51	Annabhedi	Green vitreol or ferrous sulphate
52	Karupura Śilāsattu	Bitumen
53	Kalmar naṭṭu	Asbestos
54	Kalcunnaṃ	Lime stone or calcium carbonate or oxide
55	Kaḍikkāraṃ	Silver nitrate
56	Kāvikkal	Red ochre; also silicate of alumina
57	Komotira Śilāsattu	Bituminous
58	Cenkal	Brick(s)
59	Turusumayil thutham	Blue vitreol or copper sulfate
60	Yanḍukkal	A kind of fossil
61	Nimiḷai	Copper pyrites
62	Palthutham	Calamine or zinc sulphate

(Products from) animals

63	Āamai	Tortoise
64	Mayiliragu	Peacock feathers
65	Mandaiodu	Skull
66	Kastūri	Musk
67	Kilinghil	Shell (fresh water)
68	Kombarakku	lac
69	Mānkombu	Antlers of deer
70	Gorocanaṃ	Gorojanam
71	Kozhi	Dometic hen
72	Śankh	Conch shell
73	Sānam	Dung
74	Gomūtram	Cow's urine
75	Taen	Honey
76	Natthai	Fresh water snail; apple snail
77	Palakārai	Cowrie shells
78	Panri	Pig
79	Pāṃbu	Cobra

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80	Pāl	Milk and milk products
81	Picchi	Gall bladder
82	Punugu	Civet
83	Pūnagam	Earth worm
84	Mayil	Peacock, pea-hen or pea-fowl
85	Mutthucchippi	Pearl oyster shell
86	Thaen mezhugu	Bees wax
87	Yaanai	Elephant

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CHAPTER 14

Yoga: Its Nuances and Total Health*

R.K. Pandey

* *In this chapter, the author has made a conceptual and incisive presentation of yoga and its holistic approach towards total health, intentionally leaving out the details about the āsanas and associated aspects relating to the promotion and maintenance of health. (Editor)*

The vast world of ponderables around us, from tiny atoms to the giant meta-galaxies, is the play and display of the cosmic force-field. The whole manifest creation is just an outcome of the soft stir of the un-manifest. The knower, be he a scientist or a seer, projects his perception on the objects, the reflection of which is recorded as knowledge. This reflection depends on the purity of perceptual organs which, in turn, is a dependent variable of the degree of an individual's alertness. Thus, the knowledge of the phenomenal world ultimately reduces to the state of consciousness. Higher the state of consciousness, clearer is the conceptual cognition, and deeper is the access to knowledge. Vedic sages have put it in bold words. Man as a combination of knowing, doing and being has a task, thrown upon him by nature, to take a full measure of himself with things other than himself. Or else, his whole life would become a wreckless process of self-dissipation. Yoga, the spiritual science of man, provides a method to harmonize his being and to bring about a balance between knowing and doing. And, that leads to the royal goal of a happy and wholesome life.

Significance

Yoga is the supreme knowledge of divine reality. It is supreme in the sense that, in the process of gaining knowledge through yoga the subject and his evaluation of the object, both are raised to their apex value of infinity. Yoga combines the subtlest sub-stratum of the boundless with the expressed surface layers of the boundaries; it unifies the small still voice within an individual with the grand melody of the cosmic symphony and, to cap it

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all, it glorifies the charm of the absolute with the grace of the eternity. Yoga refers to a state of mind, where all its vibrational characteristics and undulatory tendencies ebb out into the supra-mental essence of un-differentiated continuum. It is not a bundle of abstract theorization or a mere rigmarole of words or even a dogmatic adherence to certain doctrines preaching one's petty or pet ideas. On the contrary, the principles of yoga are based on the adamantine and universal bed-rock of direct experience. This wisdom flows from the tower of sapience of ancient Indian seers who, in their fine moments of finer ecstasy, have rolled down the dazzling nuggets of truth that remain untarnished by the dust of time. It is a technique of driving the mental forces down into the unfathomable sea of blissful consciousness. Unlike any other practical technique, yogic methodology entails the law of the least action and imbibes the spirit of doing less and accomplishing more. Yoga opens our awareness to the pure field of divine union and, as a result, human mind gains the ability for better appreciation of the environment and acquires a fillip to jump into effective action, which forms the basis of better achievement ultimately leading to fulfilment. Thus, yoga paves the way for the fulfilment of life and eliminates suffering in the most natural and efficacious manner.

Yoga: The Science of Consciousness

Yoga is a science of internal states of a myriad mental events. It is a science in the true sense of the term. For, every science takes recourse to the process of observations, which are systematically verified by repeatable experiments and finally generalized to draw universal conclusions. It should be emphasized that there is nothing mysterious or secret about yoga. Any sort of mystery-mongering or dwelling upon hideous manipulations makes our mind weak and crippled, whereas yoga firmly holds that "this science can never be grasped by a feeble mind, nor by any amount of dense verbiage, nor by hearing alone, nor even by intellectual gymnastics".[1] In fact, it is the science of soul, which requires a constant probing into the internal world, a sustained suspension of outer distractions, and an honest practice to validate the personal experiences in the light of one's own supervision. Just as merely going through big volumes of books on swimming will not make a swimmer, only reading authentic commentaries on yoga or listening to a learned master alone will not do. One has to be courageous enough to muster strength and take a plunge into the bottomless, roaring ocean of mind and get deep down to pick up the pearls of eternal truth. Once the intermittent experiences gets stabilized into permanent attitudes, the tremendous power of the un-manifest finds spontaneous expression in our worldly actions. It is for the enhancement of our conscious activities in the relative field of life that yoga lays utmost emphasis on keeping in perpetual touch with the absolute bliss-consciousness. Here, more than anywhere else, it is true that an ounce of experience is better than tons of intellectual exercises. Yoga is a perfectly delineated and logically formulated method of psycho-dynamics which is deemed necessary for individual soul to move into the realm of cosmic consciousness.

While going ahead on the path of yoga, not only our nervous system is purified, but also the dusty cobwebs of ratiocinative doubts are automatically cleared off. During the

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process of gaining *experiential* momentum, the dark patches of ignorance are gradually removed, giving way to the full blaze of resplendent reality. Like any other science, yoga has its own methodology, which must be strictly followed by any seeker of truth. Centuries of established results have proved it, beyond doubt, that the technique of yoga is based on a practical knowledge of universal application. Physical sciences begin from the observation of the objective phenomena and aim at finding a sense of coherence and conformity in the world of chaos and confusion. Yoga, on the other hand, starts from introspection into the vast panorama of subjective *space* teeming with psychophysical events, with a view to leading our vacillating mind from a state of perplexity to that of profound peace and harmony. Delving deep into the mysterious forces of nature and rendering them serviceable to the mankind is the innate motive of material sciences, whereas yoga aspires to unfold the full potential of human mind and holds the inner fulfilment of humanity at large as its foremost end. Apart from accelerating the growth of human evolution, yoga dissolves the dichotomy between matter and spirit, and reveals the inseparable and unambiguous unity between the two in its supra-intellectual, ultra-mystic entities.

It is in the fitness of things that science treats the subjective approach of gaining knowledge as deceitful or unreliable, and makes headway to attain an irrevocable system of explaining the natural phenomena. Subjective means of gaining knowledge, on the other hand, finds the scientific interpretations as dull, insipid and inappropriate to deal with the things throbbing with life. It is undeniably true that, for knowledge to be useful and fulfilling it must be based on certain non-variable and reliable methods. In fact, in a gentle stroke of pen or pencil, an artist can put forth the grandeur of infinity, and in a single flash of observation, the scientist can whisper the songs of eternity being incessantly revealed in the rising ripples of relativity. But, paradoxically, none of them does any justice to the totality of existence. Their views being parochial and prejudiced, they give vent only to the fragmentary and distorted pictures of reality, as they express not the total value of the observable, but just a few aspects of them. It is no wonder then that science suffers from stubborn and persistent malady of relativity, whereas the art is afflicted with the hazy and bizarre outlook. As matters stand, it is impossible to explore the totality of objective reality by scientific methods of intellectual analysis. The present-day physics faces the impenetrable barrier of uncertainty principle, which puts a limit to the precision of determining simultaneously the exact value of velocity and momentum of the nuclear particles. On the other side, artistic appreciation of nature by direct subjective perception is obstructed by certain limitations on our aesthetic sensibility. The parameters of human susceptibility and sensitivity rest entirely on the level of consciousness. If our conscious mind is narrow, turbulent and ruffled, it cannot mirror the true image of the natural, but subtle, events.

The practical application of yoga removes these limitations of human mind by expanding our consciousness to its fullest extent. Through frequent contact with the pure, unbounded consciousness and then, swinging back to the boundaries. The flexibility of mind increases which, at last, culminates in the opening of our awareness to the entire range of objective reality. Yoga tells us the technique as to how one can get stabilized in

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the state of cosmic consciousness, which is the state of an unpolluted, unbounded, and non-variable subjectivity. Thus, yoga provides a non-changing, steady and boundless background, in which the infinite celestial value of the objects of perception manifests itself on the surface of the boundaries. When the mind expands to the level of super-consciousness, the objective reality fuses with the integral mental construction, the mind-born differences between the material objects and their subjective cognition merge into a single whole, and the knower and the objects of knowledge become one and the same. It is evident, therefore, that yoga reveals the ultimate truth by enriching all the aspects of the individual and the environment by raising both of them to their supreme value.

Unless the process of knowing brings about a harmonious blending between the knower and the object of knowledge, and until a lively connection is established between the two, the thirst for knowledge can never be quenched. Yoga promotes the process of purification of the knower, thereby raising his evaluation of the object to its highest point, where he cognizes the subtlest stratum of the object along with its surface level. Thus, he becomes aware of the vertical as well as the horizontal layers of objective reality, which are spontaneously structured on the non-variable state of transcendental consciousness. If the knower's consciousness attains perfect purity, the projection of his perception on the object meets with no obstacle to cast any shadow of uncertainty, and the knowledge in this case is said to be comprehensive and complete. Only complete knowledge is fulfilling, which infuses in the seeker of knowledge a sense of absolute freedom and makes him unbending and invincible. Yoga, thus, offers an opportunity to get in tune with the highest octaves of complete knowledge of the ubiquitous reality which blossoms into benign fulfilment.

Among all the created, man alone in all creation is endowed with a will to peep into the abstract with a tendency to go beyond himself, and with a power to transform his individuality into impersonality. All other creatures, right below man, keep contented with their urge of stomach and gross sensual desires. They do not find any utility in looking beyond their nose, be it a twinkling star in the sky or a fragrant morning-glory in the garden. Man has been given the gift of intellect not only to probe the mysteries of nature, but also to look within himself and descend into the ineffable depth of everlasting charm. As a man of science, he tries to explore the whole range of the cosmos, from the vacuum of the little micro-particles to the vast plenum of pulsars and quasars. As a man of arts, he transmits the indistinct tune of eternity through the soft impulse of sound and a gentle flash of colour. But, in spite of his best efforts, the scientist fails to present the unique and exact formulation of the objective world, and the artist fumbles in expressing the intricacies of the creation in a genuine and unambiguous way. Each of them feels that there is something hideous, something mysterious and super-sensual before which he feels constrained to admit his limitations.

Quantum mechanics tells us that there are layers within the layers of existence, which can never be explored *in toto* by scientific experimentations or logical deductions. The whole universe is an open system governed by innumerable variables. When we consider certain secluded and closed systems, we, no doubt, put out a lot of them, but then some hidden variables bring in unpredictability in the quantum processes. The

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scientist accepts, in all humility, that the ultimate nature of things, even when viewed through the finest instruments and analyzed by the sharpest intellect, remains dubious and dark. The artists, influenced by superficial impressions and unable to dig out the weeds of conceptual distortions, feel that they are poor victims to the fanciful unrealities. They are satisfied with a sort of shoddy substitute for the transparent truth, and their attempts to grasp the intangible grace of nature, end in futility. The ancient seers have fitfully noted that this type of illusion is quite pardonable in situations where mind sinks by its own weighty reasons and the heart is smeared with the dust of wild fancies and pallid visions. Therefore, knowledge, gained by means of mere objective analysis or by sheer subjective contemplation, will never be complete and fulfilling. Such a knowledge keeps human mind far from achieving the final goal of real education. Yoga, in its delicate psychical operation, carries our mind suavely beyond the intellect and cultures our heart putting them at the zenith of perfection whence to appreciate the pageant of cosmic exuberance. Yoga enriches both the mental and the material aspects of life and brings about a happy union between the emotional exaltation and the intellectual enlightenment.

The Quelling of Mind-waves

Depending upon the different degrees of aptitude and attitude of an individual, yoga has been defined in a number of ways referring to the process of synthesis in various fields of activities, viz. ***the union between the matter and mind, the merger of mind into the spirit, and the total absorption of the individual soul into the universal soul.*** However, it must be borne in mind that the real meaning of yoga should not be lost in unclear notions or a haze of vague thoughts. It often happens in the history of human thought that the intended meaning of some pregnant terms is mistaken for their accepted meaning, which not only makes an accurate transmission of true idea impossible, but also gives rise to grave problems of baffling obscurity. To pretend to understand yoga by academic deliberations, discussions or argumentations is to linger in a state of wishful complacency. That is why, some people suppose that yoga is mere acrobatics or just intellectual mood-making. It should be noted that standing on the head, twisting of the spine and numerous body-postures are only an insignificant part of yoga. Some are seized even with the fantastic idea of self-torture, sleeping on the nails, swallowing glass pieces, drinking acid or burying oneself underground, as yoga. Far beyond all these juggleries and miracles, away from paganism, palmistry or astrology, yoga stands as a unique science or mental equilibrium of self-culture based on *experiential* verification for the total transformation of human personality. It may be applied within or beyond any religious framework. It is a mechanics of consciousness that laps into its wide sweep, the believer and the non-believer alike, and carries them far off from the world of boundaries and limitations to the unbounded space of supreme bliss. The aim of yoga is to strike a balance between mind and matter, and later in one's own being, between the different levels of his physical, psychological, intellectual, and spiritual set-up. The more one approximates to the unitary forces of nature ranging from the external transient objects to the enduring internal subjectivity, the nearer he advances to the holistic precinct of yoga. Once he becomes

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aware of the apparently mysterious but integrated wholeness of life, and learns the technique of psychological adjustment with what is really *real,* the eternal joy dawns on his still consciousness, and he radiates happiness, love and grace all around. The whole existence becomes a lake of bliss for the yogi, and he experiences an unspeakable ecstasy rising in every wave of his mind. Serene tranquillity and supreme delight become a living reality for such a man of expanded consciousness. Yoga claims that, by meditative introversion, any human being, irrespective of caste, creed, religion or region, can get over the dimness and darkness of ontological illusions dissolved in the unquivering glow of his inner divine light.

Perception

The great seer Patanjali has defined yoga as the quelling of mind-waves. In his yogic aphorisms, he has mentioned *yogah cittavṛtti nirodhaḥ* (yoga is restraint of mental impulses)[2]. It is essential to go deeper into its meaning. In order to understand the nature of *citta,* we have to analyze the process of perception. Every object, soft as a rose or hard as a granite rock, that comes within the ambit of our sense-experience, is invariably associated with a corresponding act of thought. An object is just a shadow of our sense-impressions on the screen of awareness. What happens, for example, when we see a rose? The photons from the sun falling on its petals are reflected by them and strike our retina. The stimulations produced in the fibrous tissues of the retina are propagated as commotions through the optic nerves, and the impressions are passed on to the back of the brain. There, the part of the brain, called cerebral cortex, registers the vibrational pattern of the interaction between the retina and the photons hitting the complex atomic structure of the retinal cells. The mind further presents these impressions to the determinative faculty—*buddhi* (intellect)—which analyzes and sorts out the details of the sense reports. Intellect reacts to these external stimuli transmitted to the brain through the triple co-operation of the organ, the nervous system and the mind. In the reactions of the intellect, sprouts the seed of egoism. The finer conflux of these actions and reactions are finally scanned by the *puruṣa* (soul), who perceives the end-all attributes of the object, and we become aware of the external reality in terms of terminal subjectivity. According to yogic classification (*indriyas*), the organs, (*manas*) lower mind, (*buddhi*) determinative faculty, and (*ahaṅkāra*) ego—all these factors combined together are called antahkaraṇa (internal equipment). These different steps of cognition are but the various denominators of *citta* or the mind-stuff. The tendency of *citta* finds expression in the creation of thought waves, which are known as *vrtti*. Every event in the external world impinging on the mind-stuff sets in motion the minute scintillations, and a train of imperceivable vibrations comes into being, which is cognizable as thought on the surface level of consciousness. Any form of thought, however tenuous, is strong enough to ensnare our awakening consciousness in its complex nexus. Human mind is tossed about in the turbulence of outer physical actions and the corresponding mental reactions, and gets lost in the mist of hazy thoughts. Yoga addresses the subjective response to the undisturbed calm of the absolute stillness. In order to achieve this goal, an attenuation of impressions and the

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refinement of thoughts is the prime requirement. Yoga provides a direct method to subdue the senses so that the thoughts are completely calmed down or, at least, they remain no longer rampant.

In the light of its distinct functional activities, the mind is compartmentalized, as it were, into different chambers. The sensation received by the body is transmitted through the senses onward to the mind, which further transfers the sense data to the discriminative faculty—the intellect. The lamentable part of the ego is that it takes the intellectual analysis of the sense-impressions as final and produces the seed of illusion that grows into ignorance and becomes, in the long run, the cause of suffering. Yoga is a means to reveal the wholeness of life within and without, and thus finds the limited view of reality, illuminated by the bull's-eye-lantern of intellect, not only useless, but also detrimental to the full evolution of human consciousness. Intellect, no doubt, as an instrument of proof, clothes our decisions in the mantle of logic and convincing rationality; but, ultimately, it makes us understand that all is incomprehensible. Therefore, yoga strives to take us out of the prison of reason into the wider field of non-dualistic freedom. The range of intellect keeps us confined to the limited domain of the opposites and our mind, engaged in the dual nature of things, abstains itself from going beyond the realm of the lower self. When thoughts, are allowed to gradually die out, intellectual judgements are automatically suspended, and the higher self is clearly reflected in the calm lake of the quietened mind. Yoga points its fingers towards something transcending the intellect, where the individuated modality of smaller being coalesces into the absolute being. And, there the self merges into the Self and the I-ness fuses into the He-ness.

The two fundamental abstract bases of the mind are known as *mahat-tattva* (pure I-ness) and *aham-tattva* (doer I or ego). The first mental stratum manifests itself as the undefined existence of mind, and the other is expressed as the part of mind employed in performing action. Every physical object, being in a state of continuous vibration, emanates a particular wave pattern, which is received by the *citta* on the same wavelength, and it plays the role of a subjective action for the outer substantiality. In that event, *citta* assumes the shape of internal physicality becoming, in turn, an object for the ego or *aham-tattva*. Here, we see that *citta* may rightly be deemed as the objective mind and the ego as its witnessing subject. But the *ahaṃ-tattva* itself gets involved with the mental constitution transferred by *citta*, and is further watched by the *mahat-tattva*. The impressions processed by the *mahat-tattva* are finally validated by the integrated mind consisting of the three fundamental strata of mental functioning (viz. *mahat, ahaṃ* and *citta*), which is termed as *puruṣa* or unit consciousness. The supreme subjectivity or the ultimate reality is boxed up in this transcendental unit consciousness. Following the technique laid down by yoga, we can bring our awareness to this state of consciousness by the cessation of mental fluctuation, which is the net resultant of thought-waves. It is only then that the duality is dissolved in the unified absolute, and the differences are healed in un-differentiated wholeness. This state of affairs is variously depicted in the symbolic language of the *Vedas* and early *Upaniṣads, Udvayaṃ tamasaspari, suah paśyanta uttaraṃ*[3] (rising above the darkness we see the diving light of the soul), *guṇairyo na vicālyate*[4] (which does not flicker in the wild wind of qualities), *budhyādi sākṣī sadasad*

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vilakṣaṇaṃ[5] (a witness to intellect and beyond the definition of truth and falsity), etc. These are some diverse versions of the same truth that roughly describe the unspeakable glory of divine consciousness.

By gradual quietening of the thought impulses, we descend below the surface level of consciousness down into the depth of unruffled ocean of pure awareness, and get a glimpse of the inexpressible charm of the unmanifest. It is only in the state or internal coherence and from the citadel of unstirred silence that we hear the melody of the infinite, being played on the flute of time. Our body and mind are two inter-dependent entities. When the mind is stilled, there is a corresponding bodily reaction as their is always a physiological correlate to every mental activity. When the body gets deep rest, the stresses and strains, accumulated in our nervous system by our past fretful activities, are subsequently released. The release of stresses not only removes the foreign matter that blocks the flow of psychic current, but also simultaneously purifies our nervous system and makes it more flexible, thereby, enabling it to adjust more efficiently with the environment.

Thus, yoga presents a practical aspect of contacting the deeper levels of consciousness and induces higher degree of adaptability in our nervous system. Consequently, it unfolds our full mental and biological potential. This results in an inner enrichment, enlivening the frayed-up nerves, and instilling in our mind unfading freshness, tremendous vigour, and mercurial vitality. Dwelling on the finer levels of thought, the mind moves towards the intense glow of greater charm, and at last gets lost into the dazzling light of supreme bliss-consciousness. Regular practice of yoga softens our brain- waves, synchronizing them into a smooth pattern, which culminates in a perfect resonance between our biological rhythm and the cosmic pulsation. Lord Krishna has rightly referred to this situation as *samattva* (balance of mind), which is a synonym for yoga[6]. After attaining this state, the sharp differentiation between the pairs of the opposite spontaneously evaporates, and we get established in yoga. In fact, the primary object of yoga is to prepare a man to take a dive in the abyss of his own being, in order to keep him in tune with cosmic wavelength in a gentle but certain way.

Yoga as skill in action

In the *Gītā*, the song of divinity, Lord Krishna has driven home the fact that yoga is not just getting tied to the noose of illusion or a state of hibernation in abstract inanity. Yoga, on the contrary, is a process of conversion of the tremendous potential derived from the un-manifest into the dynamism of action in the relative field of existence. The *Gītā* categorically states that skill in action is yoga—*yogah karmasu kauśalaṃ*[7]. From the peripheral point of view, it may sound paradoxical as to how yoga which, in essence, stands for an indistinguishable merger with the absolute silence can, in any way, add to our worldly activity. But a deeper view brings it to light that yoga, which appears to be incompatible with the *karma*, is in reality the origin of all sensible and successful actions. A dip in the inner silence enhances our perceptual ability, which is a must for any right and precise action. Our normal daily activities, in point of fact, belong to the horizontal

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plane of life, whereas the unseen evolutionary forces emerge from the depth of divine stillness, from the horizontal to the vertical layers of life. It may be noted that in the energy levels of an atomic spectrum, every vertical level is associated with a number of horizontal levels. Yoga lays emphasis on the vertical penetration down into the transquantum state of creative intelligence leaving us assured that the horizontal levels of surface activities will take care of themselves exactly in accordance with the natural trend of evolution.

Every action is an outcome of our mental input into what we have at heart. If the mind is not at its highest potential, we cannot offer maximum momentum to our motivations. Consequently, our actions will be ineffective, and the results are bound to be inadequate. Yoga tells us in unequivocal terms that first, one should get established in the subtle field of superconsciousness, and then jump into gross phases of activity with clear insight and full vigour. In the expanded state of mind, we are equipped with a better sense of appreciation of the individual, the environmental factors of which determine the functional parameters of dexterity in action delivering the crowning achievement. With increased perceptual ability and a powerful motive force, we work out the finer details of the problems and look well before we leap. Obviously, we hit the target at the right point with unfailing certainty, and our actions are bound to bear fruitful results. The unbroken inward absorption into the absolute is the fountain-head of lasting contentment, which sustains us in a balanced state of mind in all possible circumstances of triumph or disappointment. Yoga sets forth the mechanics of effective action through which we not only execute our plans in right earnest with the least effort, but also rise above the petty complexities and agonizing trivialities of life.

Having emphasized the fact that 'there is no freedom from action, but there is freedom in action', Lord Krishna asserts with prophetic vision that actions should be performed with profound skill. It is only the men of benighted wisdom, who think to shirk from action under the spell of neurotic self-abasement. The seeds of *karma* are rooted deep within us that our very existence is inextricably inter-woven with them. The impulse of *karma* is linked to the *prāṇic* vibrations in an untearable fashion, and it is hardly possible to dissociate one from the other. Yoga suggests the way to rise above them by bringing our mind back to the un-manifest field of 'being', where the question of *aught* or *naught* automatically drops out. Just as in order to remove darkness we have to bring in light, to get rid of the effects of *karma,* we have to remain in constant touch with the absolute bliss-consciousness. Thus, it is possible to glorify the whole range of action by stabilizing our mind in the state of no-action. Skill in action lies in the technique to reduce our external sense-activities to nil by transcending the boundaries of thought, getting our mind established in the state of least excitation and start acting from the point of zero perturbation.

The state of no-action does not mean inertia of rest or inaction, but a state of self-sustained dynamism which begets no opposition. No-action is a serene detachment which entails the tendency neither to oppose nor to give way, but to be resilient like a reed swaying in the balmy breeze. The pliancy of mind keeps us away from the excitement over success or depression against failure, and we remain untouched by the oddities of

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action. To enjoy the fruits of action, good or bad, and yet to be unaffected by the binding influences of action is the basic theme of yoga. This happens spontaneously when, through regular practice of yoga, cosmic consciousness becomes a steady and inalienable feature of our conscious mind. Thus, yoga not only eliminates the dragging influences of action on human endeavour, but also offers the method that leads mankind from bondage to freedom, adding grace and dignity to every aspect of life. Actions or their eventual effects are not in themselves the cause of grief or bondage. It is the inability of the human mind to embrace the eternal freedom flowing from the divine consciousness that results in bondage and suffering. If our mind is weak, simple problems defy an easy solution, which, in turn, produce negative impressions that further enfeeble the mind and erode its vitality. The desire for gain serves as the basic incentive to action, but when we incur a loss of any kind our mind is adversely affected. This generates some grave impressions that shape themselves on the surface of mind, as a desire for compensating the loss, and we are constrained to pursue the action. This chain of impression, desire, action and reaction keeps us tied to the cycle of cause and effect, birth and death, which is commonly called the bondage of *karma*.

With a view to riding over this perplexing situation, the *Gītā* tells us to adopt yoga as the integral way of life, by virtue of which the actor appreciates the actions from the field of motionless eternity whence springs the whole world of motion and actions. When actions are entrained at their origin in the restful state of mind, they cease to capture the mind in their grips and instead of becoming the bondage, they become the means of liberation. 'Skill in action' lies in performing the task with minimum expenditure of energy for delivering the maximum good. This is possible only when the doer employs himself in action with ultimate insight, from the state of enlightenment, when our surface consciousness is in spate with unbounded pure awareness. It keeps us off the slough of despondency and leaves in our mind no room for abundant gloom. When the doer is established in the Self, the total reaction-mass of his being begins to surge with the cosmic fire. The seeds of impression are burnt up (*jñanāgni dagdhakarmāṇi*)[8], and they do not have even a ghost of a chance to germinate into any future action. It does not mean, however, that the person relaxes his efforts or abstains from doing anything. On the contrary, it implies that the fruits of action do not leave any effect on his mind, and even while engaged in the field of activity, he remains beyond the bounds of the binding influences of actions. Thus, perched on the peak of lofty awareness, he enjoys eternal freedom of absolute existence along with the pictorial bloom of the phenomenal field.

Yoga: The Divine Union

Yoga, in its universal approach to sweep all mankind into its fold, recognizes the fact that for certain type of individuals the call of heart is more puissant than the powers of intellect and, therefore, accepts divine love as one of the all-embracing creative energies operating throughout the manifest creation. Realization of this cosmic power, which brings order and harmony in the midst of love, not only binds the whole humanity with the unseen threads of 'unconscious mutualism', but also expresses itself as an invisible

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relation between a grain of dust and the shining sphere of a star in mutuality. In order to grasp the cosmic notion of love, the culture of the heart is essential, which comprises a smooth co-ordination between the tender-most thoughts of the mind and the zero-point fluctuations of the absolute existence. Divine love is the most delightful employment of the human soul. Once it swings in unison with the manifold expressions of the infinite, the personality of the spiritual aspirant is expanded to a sense of abiding unity with the whole play and display of diversity. Such an individual, for whom it is said *ekatvam anupaśyatah*[9] starts radiating from his *elan vital,* the impulses of compassion on the cosmic wavelength actualize his fundamental right of freedom. Being established in *sattva,* he neither imposes anything on the object of love, nor demands anything in return, and goes on softening the crude elements in his surrounding, thereby raising the value of the environment. Universal goodness is an indispensable by product of this process. Divine love makes no distinction between pretty and ugly or uncomely. In fact, a man, who follows the emotional principle of devotion, looks at every object in creation as an expressed image of the same celestial glow.

Strife, hatred and repulsion are the indications of a tragic lack of the force of harmony, love and attraction. They are generated by the egocentric tensions when the thirst for *taking in* gets an upper hand over the tendency of *giving away*. Every man in the world has a kinship with every other man, though not of blood and seed but of mind and soul, which can only be recognized on the subtle levels of consciousness (*eṣoṇurātmā cetasā veditavayaṃ*)[10]. The hidden idea behind this fact is that we are born to assist each other as a single whole. Any deed or will against our fellow beings goes against the harmony of nature, and becomes the very essence of discord and aversion. Love is the finest force that brings about perfect balance between existence and activity, and combines the deepest within the universe with the highest within the man. When the will-to-live of one mingles without hindrance with the will-to-love of all, the undreamt state of transcendental monism is breathed in as a living reality. The spirit of unbounded affinity is bottled up within the very texture of our nervous system, which once allowed an opening, stops at nothing short of its potential best. The fretfulness and dissension of the human mind hazard the unfoldment of sublime susceptibility to the tender undulations of universal love, tending to blend with our consciousness from all directions.

Yoga provides a distinct contrivance of emotional mechanism to do away with impediments that block our nerve-cells, and to purify ourselves by taking a dip in the cosmic waters of divine love. For a man who follows the path of devotion, every object in the world turns into a sacred idol of worship, and every movement of his mind or body is a prayerful offering to the blissful divinity. His cravings for carnal pleasures give place to the unutterable delight of divine union with the absolute, and even in the ordinary act of holding his beloved against himself, he feels in existential terms, "the joy that descends from the sky to the sea". This situation should not be viewed as evanescent ripples of imagination rising in the tiny corner of space-time, but as the permanent possibility of a purple dawn of the infinite glory on our spiritual horizon. Yoga asserts that the devotional intensity raises our attention to supreme self—the bliss absolute—already within and it is not merely a projection of private phantasy.

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It is quite natural and common that our vital energy flows into the direction of whatever our conscious mind thinks fit, howsoever trivial and vain the object of attraction might be. It is no surprise, then, that our mind moves towards greater and greater enchantment, towards deeper delight and enduring sweetness. And, once it comes in contact with the never-changing charm of the absolute bliss-consciousness, it intends to settle there forever, established in the state of divine contentment. This happens only when the self gets lost for the sake of everlasting happiness. When the devotee incurs the loss of self and merges with the absolute reality, the love is born and the whole spectrum of human personality merges in the white light of divine consciousness. Devotion to the supreme reality consists in emptying the self of all its past vanities and disappointments together with the hopes and aspirations of the days unborn. It lies in squeezing the self out of existence so that the fullness of nothingness grows into the fullness of everything. Divine love begins with the free diffusion of the ego into the all-pervasive totality, and the devotee knows not, how with a knock of blinding bliss he takes an 'existential jump' into the maddening beatitude of *śūnya* the breathing void. Yoga treats love as the blissful loss of the lower self into the elegant blossom of divine fulfilment.

The normal attitude of such a devotee is that of love and reverence to all forms of animate or inanimate objects of nature. The narrow-minded rationality appears to him quite dull and dry and, at best, an intellectual fanaticism. Having discovered the mechanism of ultra-rapid transcendence of intellect, he frees himself from the tangle of likes and dislikes, greed and anger, and gets rid of the tyranny of duality. As the sense of 'I' vanishes, the clouds of confusion get dissolved into the azure space of pure existence, and the tension of the opposites ceases to hold sway. The yoga of divine union is not a wishful lapse into a sort of soft sentimentalism, but a recognition of the fact that love is the only force, knit into the matrix of space, time and existence that represents the first impulse of the unmanifest, called *kāma* in Vedic terminology', *kamastadagré samavartatādhih, viśve retah prathamaṃ yadāsīt*.[11] Thus, to be in rhythm with the gentle waves of love is to be in tune with the bliss infinite. Every action for the man on the path of devotion is an expression of the finest taste and grace. To cite the words of Swami Vivekananda: 'Wherever there is any love, it is He, the Lord is present there; where the husband kisses the wife, He is there in the kiss; where the mother kisses the child, He is there in the kiss; where friends clasp hands, He, the Lord, is present as the God of love; wherever the heart expands, He is there manifested'.[12]

To sum up, yoga is a mental technique precisely postulated and methodically worked out to bring men of both the intellectual and the emotional turn of mind into absolute union with the ultimate reality, call it God, One Existence or Bliss-Consciousness. It lays down the mechanics of pure consciousness, and shows the way as to how to enable our conscious mind to catch the glimpse of, or get established in, the blissful state of cosmic consciousness. Yoga demands an integral co-ordination of the intellect of *Śankara*, the wisdom of the *Buddha*, and the dexterity of *Janaka* for the full growth of divinity in human life. The divine disclosure of the ultimate reality is a fact of human experience, and our response to it brings glory and grace to every individual action and edifies the assessment of our environs. The seeds of bondage and of freedom as well are planted in

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the human mind. Yoga affirms the distinct theory of transcendental consciousness, and mentions the device of going beyond mind in order to make the supreme bliss a lively fact of life. Whether one is bereft of faith or, devoid of doubt, yoga is applicable to all alike. It brings fulfillment in the relative field of activity and perfect harmony in the realm of the absolute so that, even while performing actions, one rests with perfect ease in the field of unbounded freedom.

YOGA : THE DYNAMICS OF BIOFIELD

Often, our mind is seized by violent thoughts, tossed by gushing sentiments, and blown off by surge of desires. Having little knowledge of our inner, mental ebullience, we go on restlessly hunting for the antagonistic elements in the outer world of senses. But, whenever we happen to have a sigh of relief from the tempest of emotional excitements, a bit of heart-searching reveals that our sworn enemy is sitting in our own fort. In order to drive him out, it is enough to let him sense that we are wide awake. The invader in us is our own inner ego.

Our continuous struggle with the outer forces of nature is fated, at long last, to be fulfilled, and thus a pervading gloom envelops our mind, which could otherwise be made into a radiating centre of light and sweetness. The infinite glory of the nature has to be lived in full on the plane of mind, *i.e.* active consciousness. But, shrouded with ignorance, our mind keeps itself tied to the body-bound pleasures of life derived through sensual perceptions. Unless it changes its course inward, from the senses to experiences, it would be deprived of the unfading charm of internal visionscape.

Isolation: the first principle

Modern biology holds that an essential factor of evolution is isolation. Although it is an inherent tendency of our senses to fan outer world in order to suck in the essence of objects, there is a basic propensity to get at some immutable and unified entity. Our senses, sooner or later, stumble upon the truth that their frequent contacts and correlations with the objective realities lead them nowhere. When the mind is tired of trivialities, disillusioned with the unending will-o'-the-wisp, vanquished and exhausted, it recedes to the background. There, the soothing sea of tranquillity, with its vastness extending far into infinity, awaits the come-back of the mind. In fact, the constant movement of mind is an indication of its quest for the absolute bliss. It goes on jumping restlessly, as Swami Vivekananda puts, 'like a mad monkey stung by a scorpion'. Once our mind takes a correct angle for a dive into the pool of pure existence, all the extraneous impurities get dissolved in the divine consciousness.

So long as our mind is infected with the virus of vain-glorious phenotypic connections, its vital brilliance is eclipsed by false identification. Isolation involves a sharp cut-off of the organism, achieved through the process of '*neti-neti*', which finally makes the mind shine forth in its crystalline purity. In that transparent self-sameness of the

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mind, the reflection of the infinite turns into a tangible, perceptual reality. This marks the merger of the 'pot-space' of the self into the 'super-space' of the overself. The rapid fluctuation of mind, from glittering objects to dark sense-data, ultimately relegates into the steady glow of pure awareness, where the shadowy patches of perceptual impressions instantly melt away. This is on account of an innate urge of the organic system for spontaneous isolation. For, isolation is not only necessary for the building up of ordering forces and the structural organisation of the system, but it also constitutes an essential factor for the unfolding of greater evolutionary potential.

The ancient seers of India have tactfully exploited the natural vagrancy of mind for the purpose of mental isolation with an eye to devise a spring-board for leaping into the upper ocean of boundless existence (*ūrdhva samudra*) through the withdrawal of the outgoing senses, but towards the central source of untainted intelligence. The flight of mind, in the final analysis, turns out to be an expression of the centripetal power of the supra-mental consciousness. Our mental activities belong to the impulses at the surface level of consciousness. With a view to reaching the centre of our being, we have to dig deep into the para-personal field of sublime realities by dropping the burden of discursive thoughts.

Yoga and Thought-mechanism

Yoga is not based on vague doctrines or pious assumptions, but on positive and practical method of controlling the physical and mental rhythms to reach the state of highest evolution. In the yoga-terminology, the in-gathering of mind from its wanderings and getting it merged into a state of dazzling delight is known as *pratyāhāra. Yama, Niyama, Āsanas* and *Prāṇāyāma* are different preliminary footholds, which allow the mind gradually to attain divine radiance. The well verified physical postures along with the rhythmic breathing act as a catalyst to bring about psychosomatic balance and mental poise. On the physical level, yoga suggests certain tested methods to keep our spinal cord flexible, our breath-rhythm even-spaced, and our thought-pattern subtle and superfine.

The thought-mechanism is employed to wipe out the dirty impressions stamped on the mind in the course of its interactions with the transient objects of the world. Our joys, hopes and merriments; our sorrows, sufferings and depressions; our illusions, charms and enticements; our dejections, defeats and antipathies—all keep our mind bouncing, back and forth, all the time with a terrible frequency. Yoga provides an in-built technique to bid *adieu* to this facade of sense-impressions, which not only exert jarring influences on our nervous system, but also throw our mind into a state of perpetual turmoil. To top it all, yoga offers us a long-tried experiential procedure to bring our mind back to its source, and then to transcend the ego-barrier, without which the glimpse of the supreme is hardly ever possible. The anatomical harmony caused by these practices goes a long way in attaining the purity of nervous system. In that event, the invisible knots of neuronic network un-twist themselves, and this results in the release of stress and strain. Purity, chastity and honesty, in all our words, deeds and thoughts, are of primal importance for marching ahead on this path.

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Dhāraṇā, dhyāna and samādhi: The latter steps of yoga, i.e. *dhāraṇā, dhyāna* and *samādhi,* are meant for the mental control of thought impulses, which are chiefly responsible for the excitation of brainwaves. It is the pulse behaviour of thoughts that determines the fundamental characteristics of human personality. Just as there are finer and finer levels of elementary particles, so are there a good number of energy-states of thought, which overlap one another in an unforeseeable fashion. The thought-quanta keep on jumping and jostling together so swiftly and erratically that they defy any sobering effect to attune them to the cosmic rhythm. Either through quiet poignancy of concentration or through imaginative interiority of contemplation, one can master one's mental predicament and soar higher into the of soothing ambience. Also, effortlessly, by means of the technique of "let go", one can drown the polyphonic nuances of mind-waves into the monotonic transparency of beatific trance. One knows then or experiences the truth that yoga, which lulls the senses into joy, can best be expressed as an enchanting music of mind.

Yoga suggests to us to select a sort of suitable value of the inter-state coupling of mental levels with one's life-style and self-image. This temperamental insignia of mind has been referred to by the sages as *mantra* which comprises two aspects: one of meaning and the other, of sound. For quick and easy achievement of the goal set by the spiritual masters, the sound value of *mantra*, is etched out for mental repetition. It brings about a distinct dovetailing of the incoherent and unbridled thoughts. The mind comfortably climbs on the ladder of *mantra* and loses its playing truant with the thoughts. In turn, the thoughts go on getting finer and finer, metabolic rate falls down, oxygen consumption turns low, heartbeat becomes slower, and ultimately the mind sinks into a sort of 'bio-electric silence'.[13]

The appearance of a thought is an indication of the fact that a stress, which is a foreign material for the organic system, is to be thrown out in a natural and spontaneous way. In this effort, mind becomes inwards. Luxuriating in the lap of *mantra,* it fuses its differentials with the radiance of the absolute bliss. In case some knots in the organic complex are untangled, the mind comes up again on the functional field of consciousness, followed by the emission of a thought. The recurring state of inward and outward continue till the mind coalesces with the unmanifest phase of existence. Then, a condition beyond word is experienced, wherein every nerve rings with a sibilance—*somam piba, somam piba* (drink deep the elixir of life)[14], and the whole body seems to be suspended as it were, with the mysterious threads of glowing awareness.

This state of mind has been aptly expressed by the Vedic seers at various moments of transcendental revelation: *yānah pāperdaïvinā jyoṣtismatī tamastiraḥ*[15], *sante' gavaṣṭam avartayanti jyotiryacchanti*[14], *yatra somaḥ suyante, yatra yajñya ghṛtasya dhārā abhi tat pavante*[17] (where a state of soulful dynamism, all aglow with the light of truth, ferries the mind forward beyond darkness, where the rays of consciousness do away with the darkness, and open the floodgate of celestial light, and allow it to spread all over the mental space, where the divine ambrosia seeps and the sparkling wind of transcendental consciousness gently blows all around).

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Meditation links our mind to the highest state of existence, to the bliss-consciousness. In such a state, evaporate all our sorrows and miseries. There, neither is *aught,* nor the tremblings of simmering desires. Between the interval of two consecutive thoughts, there lie the junction points of the mind and the transcendental being. Ancient sages have exhorted the *sādhaka* to take advantage of that superb moment to enter into the field of the infinite, rising above the stream of 'space-time', like "the rainbow resting on the raging torrents". *Samādhi* is the apex state of elemental reality of existential grandeur, which descends from the unknown to the known sphere of our consciousness. Words fail, and the images appear quite ineffectual to convey in conventional terms the glory of the timeless reality. Patanjali has rightly called it a state of '*ṛtaṃbharā prajñā*'[18] and worded it in an aphorism as—*viśokā vā jyotiṣmati*[19], *i.e.,* 'a state of thoughtless serenity or gleaming effulgence'.

As time is a function of mind and the mind is a variant of thoughts, it appears logical to assume that time is a second derivative of thoughts. Therefore, for mind to take a leap out of time, it has to make a sort of double quantum jump—one for thoughts in time, and the other from finer thoughts to 'out of time'. It is an innate commitment of thoughts to take our mind beyond the mathematical fourth dimension; for, therein lies the ultimate abode of mind, i.e., the realm of transphenomenal reality. In this ultramental field of timeless tranquillity, our conscious personal ego disappears into eternity.

Yoga and modern psychology

Modern psychology falls short of its protracted objective of eliminating mental derangement and neurotic imbalance of man in that it takes account of only outer symptoms, but leaves the root cause of erratic behaviour unimpaired; thus, it sacrifices the whole for the part. On the other hand, the practical approach of yoga based on the tenets of *Sankhya* psychology strives for a dynamic equilibrium between the apparent forces of evolution and the latent undercurrents of involution, because the manifest 'ego-mind' and the unmanifest 'cosmic being' are inseparably interrelated like the *systolic* and the *diastolic* actions of the heart.

Earlier, there were two opposite views regarding the specific characters of individual development of a multi-cellular organism, namely, the preformation theory and the theory of epigenesis. The exponents of the former held that the basic characters of an adult organism would be seeded in the core sperm itself that would turn into transparent behaviour in the course of their temporal development. According to this theory, the fundamental determinant of organic tendencies are involved in the inmost centre of the cells, which gradually evolve under certain environmental conditions into the manifest modes of action and response, keeping their integrity intact under extraneous situations. The totality of the reaction-mass of one's being would thus be translated into a kind of bivariant modality of thought and behaviour, which is called 'personality' in common parlance[20].

On the contrary, some others declined to accept this doctrine. They were of the opinion that the characteristic development of the action-mode of an organism is

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determined, in the main, by the outer influences of the environment. The environmental matrix imparts a vital pre-vision to the organism so that through some kind of formational impetus it advances towards its maximum evolution. Paradoxically, this epigenetic concept, if pursued logically, would lead to preformism with the only difference that it substitutes a 'living force' of non-material quality for the material forces of pre-determination. However, the dispute between preformism and epigenesis was reconciled and a synthetic view emerged in which the involved characters are identified with the structure of the cell-nucleus and the environment is recognized not only as a manifold of conditions for growth, but also as an essential component of organic evolution[21].

The present-day psychology hardly takes into account the basic nature of finer biological forces, but deals only with the functional level of surface consciousness. But the yoga, which encompasses the totality of existence, aims at achieving the 'Supra-mental State' of consciousness. For, anything less is incapable of disembodying the duality or dichotomy of mind and world. The technique of meditation or the training of mind enhances the possibilities of self-regulation as well as adaptive response, and makes an allowance for the unobstructed inflow of external information as well as their internal absorption. The holistic approach of yoga, therefore, is inclusive of the primal and potential field of both the forces of involution and evolution. It injects a kind of harmonious orderliness into our mind, which is otherwise a miniature pandemonium of devilish desires.

The pioneer of modern wave-mechanics, Erwin Schrodinger, makes a pointed reference to the effect that "to live is to suck orderliness from the environment[22]". The Vedic sages long before recognized the plane revelatory experiences that in the state of cosmic consciousness, the divine forces thwart away the uncouth obstacles and dissolve the darkness in the flame of self-illumination (*ud gā ājad abhiṇad brahmahaṇā valaṃ aguttamo vyacakṣat svaḥ*)[23]. Thus, in yoga, the celestial glow *ad gustum* has been presented as the most potent anodyne to the mind of the man dwarfed or deranged. Through meditation, the mind enters into communion with a mysterious dimension remaining neutral to the delights or disappointments of the relative world, and intimately shares the inexplicable state of the absolute, with equanimity and tranquility.

Brainwaves and biofield

According to modern physiology, each nerve cell consists of several filaments that shoot out in different directions. Out of a number of these filaments, technically termed as dendrites, one is quite a bit thinner and longer than the others, and this is called an axon. The electrical impulses of the cerebral cortex course through these axons to the other axons of the nerve cell. The point of contacts between the two axons are known as synapses, which act like valves, and they allow the stimulus to pass in a single direction and whittle down their chances of come-back to zero. Through these agencies, the receptor nerves screen out the impulses and transfer them to the affect or motor nerves for appropriate action. The human brain is an enormous store-house built up of tiers upon tiers of innumerable axons which, on account of their microscopic chemical reactions,

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continuously generate exceedingly weak electrical currents, and keep our mind in a state of perpetual excitement.

The faint electrical impulses, produced by the excited axons, are called brain-waves. In the normal waking state, of waking, the brainwaves transmitted by the frontal lobe of the brain are of mixed frequencies, random, inconsistent, and generally out of phase. But, during meditation, they show a marked uniformity of frequency and amplitude. In that event, a sort of constructive interference takes place, which is a pointer of better perceptual co-ordination. This neuro-physiological state of mind is called brainwave synchrony, in which the discordant noise pattern of the waves turns into harmonious symphony.

***Neuro-physiological*:** Recent developments in neuro-physiology have shown that the yogic practices improve the functional integrity and the orderliness of one's mind and body. Enlightenment, the focal point of yoga, may be defined as a subjective experience of perfect order, which in itself is a means of maximum stability with the minimum adaptative disturbances. In concrete scientific terms, yoga is an adroit device for neuro-physiological refinement in order to secure the state of blissful existence and peaceful harmony. The deep metabolic rest attained during meditation does not represent a half-sleep or drowsiness; instead, it is a state of profound wakefulness, which is physiological equivalent of unbounded awareness.

When the active but random impulses of the mind settle down, there occurs a total coherence of the brain-wave pattern, and the mental bio-field attains the state of the least excitation. Just as the vacuum state of quantum physics is the creation field of all possible configurations of matter and energy in the universe, so, too, the perfect brain-wave synchrony in the state of least bluster of consciousness is found to be full of all possibilities. It has the capacity to create anything within itself, since in that state all the creative impulses flow without any friction. Thus, by following the mental technique prescribed out by the ancient yogis, the state of highest degree of integration of the central nervous system obtains, which brings about perfect co-ordination between the cerebral impulses and the physical responses. On the biological level, this closely resembles, what the physicists call the state of infinite correlation. It is an established fact that high coherence of brain-waves makes available all the neurons to the gentle cosmic pulsation which, flowing through all the feedback channels of the nervous system, imbues our mind with a sense of holistic rhapsody and a panoramic serenity of creative fullness.

The Russian biologist, Inyushin Sergeyev, has put forward the concept of bio-plasmic radiation associated with various parts of the body, which assumes appreciable accentuation in certain cases of psychic sublimation or spiritual excitement[24]. It characterises a new state of energy beyond the four states of the physical world—solid, liquid, gas and plasma. It is quasi-electrical in nature, and shows a marked similarity to elementary particles. It is most pronounced in the brain; the fingers and the solar plexus being the other remarkable radiating centres of the bio-plasmic field. Various forms of para-normal phenomena can be attributed, in all probability, to the discernible changes in the spectrum of electro-bioluminescence associated with bio-energetic potential of mind. The bio-plasmic force-field has been found to affect other objects at a great distance through an invisible transference of mental power.

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Modern researches in the field of metaphysical phenomena, including those of the Nobel Prize winner, Charles Richet, and the British physicist, W. J. Crawford[25], lend sufficient evidence to the fact that in the trance state, the body-cells are found in some cases to exude a basic biological substance known as *ectoplasm.* Once outside the body, this assumes several uncertain shapes, and at last gets sucked up into the source-body. It has been observed in some single-celled creatures, viz. *amoeba*, that their cell-nucleus is enclosed by a mucous protrusion of protoplasm, the inside of which is underlined by some thin films containing minute dots and droplets named *entoplasm*. The sleek external layer of the protoplasm is called ectoplasm. The latter has the peculiar characteristics of an unstable, amorphous extension, and a root-like excrescency in different directions. On account of this obvious semblance, the substance emanating from the body is an indication of deep meditational intensity and sharp concentration, *i.e., agryā buddhi*. It is supremely subtle, but extremely effective force-field, which can work wonders beyond our normal rational comprehension. The powers of our thoughts and ideas are directly related to the efficacy of the bio-plasmic field-strength guiding our life, behaviour and destiny. Many of us intuitively make use of this field in forming a positive mental attitude towards life, which offers a grand promise of solace, peace and fulfilment.

Yoga in its manifold dimensions shows a way to the optimal programming of the mental causal field mingled with the psychic sphere of man. Patanjali has clearly mentioned in his *Yoga-sūtra* that, in order to get at the root of one's subtle causative level, one has to extirpate even the finest trace of inner incitement, otherwise, complete consonance with the unmanifest phase of cosmic consciousness would be a far cry. From the transcendence of the source of thought ensues the elimination of ego-centric manifestations of mind, and our individual organic entity is full to the brim with the soft glow of divinity - *nirvicāra vaiśāradye adhyātma prasādaḥ*[26]. According to yoga, the very interaction of the subjective content with the observable elements needs to be avoided so that the incandescence of the absolute would descend on our functional consciousness (*draṣtridriśya samyogā heya hetuḥ*)[27]. In the wide range of the observables, this would include all the actions and reactions pertaining to light, motion, sensation and stimuli entertained by the senses (*prakāśā kriyā sthitiśīlaṃ bhutendriyātmakaṃ bhogāpavargārthaṃ driśyaṃ)*. Along with the extinction of the after-images of memory, yoga aims at the total ejection of latent genotypic imprints from the mind, so that the whole nervous system is turned into a spotless sanctum of supreme glory.

The four forces of the present day physics, viz. weak, nuclear, electromagnetic and gravitational, are quite inadequate for explaining the exact nature of bio-plasmic transmutation. But, modern scientists cannot afford to be dogmatic, and some of them have begun to pause and ponder over the possibility of a fifth kind of psycho-kinetic force that lives and moves in and through all the objects of the world. The dynamic direction of this bio-field is implicit in the operation of the force of the *psyche* itself. This accounts for the mobility and restlessness of the mind. Yoga makes the best use of this natural tendency, and turns the mind towards the attainment of supreme bliss where the mind feasts and *libitem* on the delicacies of celestial gratification.

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Yoga: A Holistic view of Health

Till quite recently, people hardly knew that a fragmented world-view could play a havoc on the health of the people and the environment. The word 'health' actually indicates a close connection with the 'whole', as it is derived from the root *'hal'* which means robust, whole and health. The words with similar intonation like 'hole', 'heal' and 'holy' are some other variants of the same origin. It would be, therefore, wise to regard health as a balance among various factors of the body, and the surrounding biosphere leading to a kind of subtle attunement of the mind with the soothing rhythm of nature. And that, in fact, gives a taste of transcendence. Perfect health implies the feeling of physical, psychological and spiritual harmony, which when disturbed would cause disease, insomnia, illness, insanity and mental hazard. Such a loss of self-identity with the *whole* is what the sages call a great perdition (*mahatī* vinaṣṭi) or annihilation.

What really is health?

It is extremely important to define health as broadly and clearly as possible before setting out to heal an ailing system. The question 'what is health' has often been avoided or dismissed as a philosophical issue. But the medical scientists have recently realized that such an apathy has further compounded the problem of health, and accentuated the Cartesian divide that has laid over-emphasis on the physical aspect of therapeutic models. It, no doubt, marks a victory of hard facts over soft emotions. But a survey of disease patterns reveals that in the matters of human welfare the latter demands more attention than the former. An objective definition of health can be derived from a living organism, and its relation to the environment, from which it sucks energy to sustain itself as comfortably as possible. But the *homo sapiens* has some extra dimensions of existence, of reason, thought and emotion. Therefore, it calls for a system-view of health of a kind described by the World Health Organization as 'a state of complete physical mental and social well-being, and not merely the absence of disease or infirmity'.[29]

Yoga embarks upon a still higher and holistic view of health. It is truly a technique of healing the self, which as sick with many maladies of mental distortions, with gross aberrations in our choice-making, and a host of our illusions. Yoga does not have any quantum mechanical plan to locate exactly the self in the body or the brain or to find out the queen of the strange ant-colony of the neurons. But it does define the self as a self-referral state of mind (*turiyā*) known in modern parlance as 'no-mind' or 'beyond mind', in which not a flicker of thought is present and yet there is an ambience of blissful omniscience. The software analogy of mind is not sufficient to describe the self. A query about the stuff of the self is equally meaningless. For, it is like asking what stuff love or humanity is made of. Self is, in fact, a state of being, in which the knower (*jñātā*) and the knowable (*jñeya*) are one existing as pure awareness, as a wordless knowledge or an inexplicable experience of joy. Self is itself without any reference, and since it is not bound by space and time, the question of its location is senseless. The self is a holistic concept, therefore, the question what the self is made of hardly arises. Yoga adopts the principle of holism and applies it soundly to health.

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From the title Patañjali has give to his text on yoga, viz. *Yoga darśanaṃ*, it is pretty clear that yoga is a *darśan* which, though broadly defined as philosophy, has many shades of meaning, viz. looking at, observing, knowing, perceiving and examining. It is a philosophy of life and self, as it preaches an approach to reality, and provides a unique platform for an enquiry into the nature and structure of the world in simultaneity with the man who observes the world. An object of observation, as yoga puts it, is governed by three factors, namely, state (*sthiti*), action (*kriyā*) and illumination (*prakāśa*), whereas an observer is wholly distinct as an embodiment of pure energy, which makes him possible to observe[30]. Patanjali further states that man is not only an observer of the outer world but also of a world, within himself. In a total cosmic situation, we are placed between two worlds in a precarious balance playing the role of both the *seer* and as the *seen*. And, that makes a ground for dichotomy in our thought and action. Yoga aims at establishing an everlasting harmony between the seer and the seen in such an authentic way that *the observer*, to use the modern phrase, becomes *the observed*!

Instead of looking at the world as a vast conglomerate of the living and the non-living entities, yoga views them as some having senses (*sendriya*), and some others as not (*nirindriya*). Thus, the difference between the animate and the inanimate objects is merely a matter of transcendence, and transformation from the unmanifest state of consciousness to the conscious level of mind. The creatures, man included, possessing the buoyancy of brain and mind, still have a natural tendency to go beyond mind and experience the field of unbounded free realm of cosmic consciousness. The body, too, while going through that experience of uncontaminated bliss, feels itself as a mass of light and symbol of ideal health. In other words, yoga says that one has to cast away one's ignorance, attain wisdom, and allow one's full mental potential to unfold, to go beyond mind and be one's real self. The secret of spiritual health of man lies in coming home to his real self.

It should be noted that everything observable is the creation of a primordial contact between two distinct archetypal energies: one of pure consciousness, and the other of dark inertia. This contact (*saṃyoga*) is called ignorance (*avidyā*). Yoga defines *avidyā* 'as an illusion of permanence in the passing of purity in the polluted, and of pleasure in what is ultimately painful'[31]. *Avidyā* has a deep impact on the mind of man, since it makes him think of himself as a body. He forgets that a body is an observable, and it can never be an observer. The tragic continuity of *avidyā* hardly spares a man to pause for a while, and ponder that his real nature as a *seer* is something entirely different from his *body*. Not paying attention to such a vivid fact and, on the contrary, to identify oneself with the body amounts to a tension called 'I-am-ness' (*asmitā*). On account of admission, there accrues an ideational gap between the observer and the observable. As a result, the world-view of man, the very foundations of the knowledge become shaky in the ambience of agonizing uncertainty. The cause of sorrow lies in confused thinking, which in itself is a disease of the *psyche*. Those who try to escape from the sorrow and disappointment of life, fall in the same old groove again and again; but those who accept their trials and tribulations as a necessary condition of the way of the world, make a new beginning of discovering their true identity (*svarūpa*), which is full of joy and free of tension.

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Swept by the current of ego (*asmitā*), an observer is forced to enter into an existential relation with the world. The process of relating the *seer* to the *seen* engenders a kind of rough interaction, and builds up tension in the experience. There is a contradiction in thought-process with the psyche. Yoga seeks to eliminate the root of inner tension and to sow a seed of delight in the mind which gradually but surely flowers into a sense of freedom and bliss, into an ecstasy of emancipation from the ego-imposed bonds. Yoga defines health as an unconditioned form of mind in which man is a silent witness to the glowing awareness of his being or joyous state of self-existence. Therefore, health means living wholly in peace with oneself (*svarūpa avasthānaṃ*)[32] .

One *Pātañjala Sutra* states that the crude connection between man and the outer world is a necessary outcome of ignorance (*avidyā*), which darkens the vision of truth and presents a distorted world-view. In effect, a mind shadowed by ignorance becomes a breeding ground of tension, conflict and confusion, creating incoherent ripples leading to *psychic* tension. Modern psychologists refer to this state as a disease of the mind, and conclude that all ills originate from sub-conscious disturbances, mental inequilibrium or *psychic* imbalance. Patanjali calls it *kleśa*, (innate pain), considers it as the cause of suffering, and intends to uproot it. *Kleśa* is not simply a pain in the body, but also a symptom of an uneasy *psyche* (*janma vedanīya*)[33], of a disturbed mind and more deeply, a disease of the self as well. Yoga describes *asmitā* (I-am-ness) as a bottom-line stress that forbids an inner illumination of man's existential situation *vis-a-vis* the external world, and creates a chasm between the ideal and the real. It follows naturally that greater the gap between the real and the ideal, greater would be the amount of suffering. Further, *asmitā* is defined as a false notion—that the energy that enables one to observe (*dṛk-śakti*) and the energy associated with an observable *(darśan śakti)* are the same[34]. This idea impels our mind to identify a thing with our thought giving rise to a desire to possess that never belongs to us in a physical sense. Such an impression is the native cause of *kleśa* or tension. Yoga, in a very succinct manner, precisely locates the point of pain, and provides an all-round remedy to extirpate human agony. And, this in itself is the greatest criteria of perfect health.

Health and Mechanical World-view

Every system of healthcare has a history, since it develops within a certain atmosphere of ideas and a cultural background. But, with the emergence of new philosophies, variation in economic conditions or a shift of religious priorities, there occurs a drift in cultural values, and as a sequel to it the notion of clinical systems often undergo a change, and the methods of treatment also requiring an adjustment in their models of healing accordingly. Modern medical science is an offspring of the western theories of biology, and follows a model built up on the mechanistic view of life. It bears within itself a distinct signature of Cartesian paradigm, which says that human body can be regarded as a machine made up of nuts and bolts of the bones and the muscle parts with wires and sinews of nerves. It can be further analyzed into cells, neurons and genes, which ultimately resolves into a network of quantum biological particles. The situation is best summed up

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by George Engel: 'The medical science holds the notion of the human body as a machine, of a disease, as the consequence of breakdown of the machine, and of the doctor's task as a repair of the machine.'[35]

Ever since Descartes drew a sharp line of separation between mind and body, and propounded that the body behaves as a machine that can be explained in terms of the structure and functioning of its parts, all the bio-medical models have been framed on a clock-work pattern. In the light of such models, healthy person is one whose mechanical parts stand in good order, and if some screws are loose or worn out somewhere, he is ill. Like physicists, who break matter into fundamental particles and then as the building block of the visible world, men of medicine, too, reduce human body to a bundle of carbon atoms or a set of protein molecules and see in them the tissues of life. Such a drastic fragmentation of life into mechanical parts serves as a breeding ground for more diseases than it promises to cure. Obviously, a model of health founded on Cartesian design is not a comprehensive one, nor is it suitable for a thorough preventive measure for curing diseases.

Even three centuries after Descartes, his influence on the science of medicine has not quite faded out. The modern-day doctors still hug the concept that a disease of the body is a disorder of its particular part, and they have a duty to set it right through some physical or chemical means. They, however, ignore the fact that by focusing gradually on the area of body in the name of specialization, they are prevented from looking at the patient as a whole human being. A partial and reductionist approach to the problems of health is a big hurdle to a healing, since it takes account of the *part*, and not the *whole* which is much more than the parts of which it is composed. Consequently, the present mode of treatment takes care of the symptom, but leaves out the root cause of the disease. Such an approach inculcates a narrow view of health, which must be transcended in order to grasp the unitive factor that governs the process of life and provides a chance for total health, not of the body alone but of the mind and the spirit as well.

A grotesque attitude to health converts the doctor of a disease into a mechanical engineer of the body, who thinks that an outside manipulation is a must for restoring the damaged *part* to its normal working condition either through drugs or some practical or radiational devices. In severe circumstances, the current way of therapy comes down to detach the defective *part* and replaces it with a proper substitute. It has scant regard for the inner potential of the patient to heal by tapping the tremendous source of energy lying within himself. A partial healing or a surgical treatment definitely proves beneficial for a while, but in the long run it does not make the person feel totally well; instead, it can pave the way for some other unpredictable kind of illness. The divisive technique to treat a local ailment confined to a particular domain of the body-system has given rise to an enormous branching of medical discipline to such an extent that a doctor specialized in treating the left eye may someday hesitate to tell anything about what is wrong with the right eye! To be brief, modern science of medicine itself suffers from a chronic fever of excessive fragmentation.

A highly specialized doctor, as some critics have aptly remarked, hardly treats a human being. Far from it, he treats in terms of the fantastic terms of his textbooks. A

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mere display of diagnostic labels of a doctor lands the patient in a mire of confusion, and he does not know what really is the cause of his trouble. The bio-medical model in vogue confers a supreme authority on a doctor, who dictates a sick person over his health, because only the doctor can do what he wants on the basis of his knowledge, laboratory tests, and his observation of the clinical data. A shallow biological view of disease, a rigid frame of medical model, and often a cold unfriendly behaviour of a doctor reduce the patient to a log of wood on his table. In the process, the emotions, worries, social factors and psychic sensibilities of the ill are brushed aside. With the result, it tells upon the ability of the patient to heal himself. Modern medical practitioners need to realize that aside the scientific knowledge and technical expertize, wisdom, compassion, patience and sympathy towards the psychological aspects of the ailing individual prove more conducive to health care. In any event, it is not the fault of the doctor, but the defect of the Cartesian-Newtonian framework of the medical model, which injects mechanics into the therapeutic measures. Therefore, it is necessary to understand that the reductionist method of treating human body as a machine cannot completely solve the problem of health and an integral view of a system-approach to bio-medical management should be adopted—a view that a disease is an overall combined effect of mind, body and environment. This will help lay down the foundation of holistic model of medical diagnosis and perfect health maintenance.

However, with the advent of quantum mechanics, there is in the offing a general fluctuation in the value system of medical science with a visible tilt towards holism. Modern sciences, specially, physics, biology and psychology, have now developed a view of reality that leads to a holistic approach to healing. This view appears to stress that the mind, body and spirit are in fact not separate in the deeper layers of existence, but an integral whole of a harmonious design. The Newtonian physics did not permit the conscious factor to pay any party in the matters of physical phenomena. But, the recent discoveries in physics have revealed that in the mysterious interplay of microparticles, there is a spontaneous ordering of the opposite constituents of nature, and we are ingrained into a kind of harmony with the world that is essential to the order of the *whole*. Everything has an intrinsic character to retain an element of goodness in the interest of all, and an ability to bring itself into being in tune with cosmic symphony. The scientific researches based on the Newtonian concept of reality tried to break and analyze a system and to reduce it to its minutest level in exclusion to everything else. But the quantum mechanics, an ultimate flowing of modern physics, has reached a point that proves the unity of all things. The principle enunciated by Geoffrey Chew, known as *Bootstrap theory,* says that all are locked up in one. To be precise, each particle in the world consists of all other particles elsewhere, and exists as an inter-connected web of relations[36].

A physiological version of bootstrap mechanism is ostensible in the activities of immune cells governed by the behaviour of the molecules called neuropeptides. They move through the entire body and serve as a messenger to converse with a receptor molecule. In so doing, they seem to take the cue of an instruction from the brain. Truly, their activity depends on the mood of the mind. In that sense, they are considered as the

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bio-chemical 'unit of emotion', which transforms an inner feeling into an outer fact of body-event. Still, another finding indicates that the prime cells in the immune system, known as monocytes, have a cloud of receptors for peptides. The effect of virus infection is directly proportional to the density of these receptors as any virus signal will have to pass through them before it affects the cell. Further probe into neuro-mechanism reveals that if the nerves are removed from the spleen or the lymph nodes, the immune response is nil. It means that mind is in constant dialogue with the immune system. Thus, in the light of modern biological discoveries, mind dwells in each cell of the body. It follows, as a corollary, that all healing processes work on the sub-conscious level at the hidden command of the brain. Obviously, the Cartesian dichotomy gets discarded at the quantum biological plane. It sounds more sensible to talk of body-mind as a single integral system.

The quantum world-view has started showing a sweeping switch-back effect on what is called 'medical scientism'. The germ theory of Pasteur is subject to skepticism, the immunity side is getting a sharper edge, and an awareness of the patient about the extent of somatic imbalance is being openly discussed by the doctors who feel inclined to revive some of the old techniques of treatment that are almost forgotten. Many diseases like cancer, heart-attack, stroke and diabetes are thought out to be caused not so much by outside microbes, as by an asymmetric life-style and the lack of inward coherence. Patients are being educated about the nature of their illness, and psychological counseling is administered to boost their ability of self-healing. The main duty of a doctor, as the meaning of the original word 'decode' suggests, is to teach and then to treat only in extreme cases, if the need arises. Neuro-scientists know it better that the higher nervous system is so tangled that its true functioning cannot be grasped by simply reducing it to a molecular level. All this boils down to the fact that each cell involves the whole body in its small dimension, and follows a multi-causal train. The holistic approach demands that in dealing with a disease, all the physical, psychological and mental parameters must be taken into account collectively, if a condition of perfect health is desired.

At the close of the twentieth century, there is an air of growing disenchantment with the ways and means of high-tech healthcare. As an expression of resentment with allopathic treatments, many alternative therapies ranging from humoural theory to hypnotism, and radiance to reflexology are set to blaze the horizon of the twenty-first century. Reiki, rebirthing, sonatics, magnetics, aerobics or, *Tai Chi*, whatever the name, the basic theme of energetics of these pop therapies is the same: that the mind and body are inseparably wedlocked into *one* and differ only for the sake of definition. But, in their action and effect, they are the piecemeal displays, which can hardly stake the claim of being fulfilling, compact and impactive. For a momentary joy of feeling fit, they are fine enough, though in the context of total authentic situation these mushrooming alternative practices fall far short of their theme. Some of them are kinetic in character, and others of static nature; but none of them examines its adverse effect on the human society. Such therapeutics are confined more to mood-making devices and run as fashion shows or business propositions, but they scarcely imbibe the gestalt view of life based on a positive concept of complete health.

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Health and Yogic World-view

The truth of yoga does not need to be verified in a scientific laboratory but, if done so, it can prove its validity. In a very convincing manner, it says : You are the fact and you are the proof. No one and nothing else can be yourself. Travel alone on the roads of your inner world, and you will reach the goal. Seek and you will find. Then what other proof you need? Your finding the gold-mine of your being and getting at the peak of peaceful delight is itself a proof enough that you are in the pink of health and happiness. Yoga is a way of life practicable by any man whatever his age, condition of health, caste, creed or racial denomination, and it is not a religion. It proclaims that human body is a microcosm of the universe. All the gross elements of nature—air, fire, water, earth and space—are encapsulated in each cell of the biological gift called *man*. It also strives to set a condition of mind in which the body (*bhūta*) and senses (*indiryas*) mutually equilibrate, so that the unsteady oscillations of the senses toward the differing objects of the world converge at a point of all-inclusive vision (*ekāgrtā*). For a perfect health, the inner ecology of the human organism has to be held in dynamic balance with the environmental ecology of the external world. This kind of stabilization gives rise to an exalted experience of quietude known in yogic terms as *ekāgratā pariṇāma*.[37]

According to yoga, man's world-view is an outcome of an interaction between the mind and the body-senses. It generates turbulence in the temporal complex of the brain molecules. Yoga calls it *vyutthāna*, which means agitation.[38] Out of *vyutthāna*, a particular picture of the world emerges, and a man identifies himself with that picture. This sensual attachment with the external reality assumes the form of *vṛtti sārupya*, that is, an identification of oneself with the surface reality of his sense-impressions. Yoga has a high point of eliminating the effect of senses (*vṛtti nirodha*), and to take the mind out of the wood of impressions and tensions.

Yoga admits that in general circumstances the world-view imposed on our mind is proportional to the words we have heard, to the meanings derived from them and to the experiences of the language-oriented reality. If the dust of nascence is brushed aside, the world of words crumbles in a trice, the familiar world of our choice evaporates, and a new world is born '*whose voice carries the sound of infinity*'[39]. It may be pointed out that yoga itself uses words to describe the true nature of the self and the world-view. But again, these words, the yoga says, are simply directional as a finger raised toward a distant star, which should not be mistaken for the star itself.

Man is a mystery of mixed metaphors, a lively symbol of myriad moods, an anatomical complex of neuronic network with a mind capable of diversifying itself in many dimensions. Each mood or dimension of mind creates a world of its own, and if it does not tally well with the world already given to us and run by the cosmic forces of nature, there is a tension. And, an unknown fear shuts the doors of freedom. The greatest fear of man is himself, because all through our life we go on suppressing and denying the self within us, and this affects our health adversely. Yoga says, to be healthy, one has to be the *whole* of himself, to be one with the self, and to diminish the distance that separates him from the world. Yoga thus provides a framework of mind in perfect synchrony with the world outside, and a world-view to make one healthy, happy and free.

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CHAPTER 15

Ayurveda, Unani and Siddha Systems: An Overview and their Present Status

S.K. Mishra

The philosophical, scientific and cultural achievements of India before the Christian era do appear to have been fully appreciated by historians and the scientific world because of several reasons. During the Muslim and European occupations, the rulers felt that anything worthwhile did not exist in India before the Greek-Roman civilization. Even now, most of the intelligentsia and the common people do not have an adequate knowledge of the notable achievements in science and medicine in India before A.D. 1000.

Pre-Vedic Medicine

Evidence of the existence of a well-organized system of health-care in India can be traced to the archaeological remains of the Indus Valley Civilization or Harappan Culture, which flourished during 2750-1900 B.C. and in a decadent manner till about 1600 B.C. The city of Mohenjo-daro of this civilization was well-planned and divided into blocks, streets and lanes. There were rows of residential houses on both sides with wells and a large public hydropathic structure, which the archeologists call the Great Bath. Each house had a separate bathroom provided with covered drains, which were connected to the street drains and soakpits. This elaborately planned drainage system, a notable feature of this civilization, reveals the special care bestowed upon sanitation and health even at that time.

There is a view that the worship of Lord Śiva and the Mother Goddess was prevalent in the Indus civilization. Lord Śiva is regarded as the first physician among gods. The mythical origin of *jvara* (fever) is attributed to this god in the Ayurvedic texts. Some historians attribute the pre-Vedic civilization of Harappa and Mohenjo-daro to Dravidian culture that recognizes the Siddha system of medicine as having originated from that culture. Interestingly, the origin of the Siddha system of the medicine is also traced to Lord Śiva and the *Siddha saṃpradāyaṃ* is also known as *Śiva sampradāyam*.

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Vedic Medicine

The origin of Ayurveda can be traced to the Vedas. The *Ṛgveda* and the *Atharvaveda,* in particular, contain a good deal of medical and health-knowledge. The twin Ayurvedic physicians and surgeons, *Aśvins* of Vedic origin, were worshipped for health, happiness and long life. Many diseases like *yakṣma, takman, balasa, harimān, kilāsa* and others have been described in the Vedas. The methods of treatment employed in Vedic medicine included (i) prayers and offerings to gods like Indra and Varuṇa; (ii) internal and external use of drugs of vegetable origin; (iii) mechanical devices like catheter for curing the retention of urine as well as surgical methods for puncturing glands, operation of wounds, etc: and (iv) use of natural agencies like sun-rays, fire, water and air, as remedies for curing certain types of ailments.

Post-Vedic period

The post-Vedic literature like the *Rāmāyaṇa, Mahābhārata,* and the *Purāṇas,* are replete with references to Ayurveda. In the *Rāmāyaṇa,* the treatment by Suṣeṇa Vaidya, of Lakṣmaṇa, who was in a coma after being hit by a sharp-edged weapon by Meghanāda, is well-known. There are descriptions of important medicinal plants like *sanjīvinī, savaraṇakarṇī, viśalyakarṇī* and *sandhānakarṇī* in the *Rāmāyaṇa* in the context of medicial treatment. The *Angipurāṇa, Garuḍapurāṇa, Nāradīyapurāṇa* and *Viṣṇupurāṇa* provide many details relating to health-care and treatment in accordance with Ayurveda.

Medical references are also available in the Buddhist and Jain traditions. Lord Buddha himself is known as *Mahābhiṣak,* (the great doctor), because he showed the path to liberation from disease and death. The famous Buddhist classics like the *Tripiṭaka, Mahāvagga, Dhammapada* and *Divyāvadāna,* are full of medical knowledge. It is a well-known historical fact that the famous Ayurvedic physician of Pāṭaliputra, Achārya Jīvaka, treated Lord Buddha on many occasions. Jain tradition had also a branch of medicine known as *Pranavaya.* The Jain text, *Kalyāṇakāraka,* is an important book on medicine, written by Ugrādityacārya during the 9th century A.D.

Travellers' Reports

Several Chinese travellers in ancient times have also reported about the medical facilities available in India during their visits to various places in India. Fa-hien came to India in 399 A.D. and sojourned in important places for 14 years. His observations on Pāṭaliputra (modern Patna), the capital of Gupta Emperors during that time, were that 'the nobles and house-holders of this place have founded hospitals within the city, by which the poor of all countries, the destitute, crippled and the diseased are benefited. They receive every kind of requisite help gratuitously. Physicians examine their diseases and prescribe food, drink, medicine and decoctions, as per their diseased condition. When cured, they depart at their convenience'.

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Yuan Chwang was in India from 629 to 644 A.D., for fifteen years, during the reign of King Harshavardhana. He travelled in northern India, and stayed for five years (635 to 640 A.D.) in the Nalanda University (near Pāṭaliputra) as a student initially and, thereafter, as a teacher under the directorship of Ācārya Śīlabhadra. Yuan Chwang has given a detailed description of the University, and written that medicine was among the five major subjects being taught in the University. On the methods of treatment, he has described as follows: 'Everyone who is sick is not provided food for seven days. In this interval, the patient normally recovers. If health is not regained, then he takes medicine. The medicines are of various kinds, each having a specific name. The doctors differ in medical skill, and in prognostication'. It Tsing was in India from 673 to 695 A.D. and also studied at the Nalanda University, besides visiting other places. He has recorded that 'medical science is one of the five sciences (*vidyā*) in India, and that it has eight sections (i) *Śalya; (ii)Sālākya; (iii) Kāyacikitsā; (iv) Bhūtavidyā; (v) Agadatantra; (vi) Kaumārabhṛtya; (vii) Rasāyana* and *(viii) Vājīkaraṇa.* These eight arts formerly existed in eight books, but lately a man epitomized them and made them into one bundle. All physicians in the five parts of India practise according to this book, and any physician who is well-versed in it never fails, and they give relief to others as well as benefit themselves'. It Tsing has also stated that 'the medicinal herbs in India differ from those of China, but the herbs like *hārītakī* (Terminalia chebula); *kumkuma* (Saffron); *hiṇgu* (Ferula narthex); *baross camphor*, cardamom, and clove are used similarly in both the countries'.

The Universities of Takṣaśila (7th century B.C.) and Nalanda (4th century A.D.) were the renowned centers of learning in Ayurvedic medicine, and they attracted a large number of teachers and students from different parts of the then-known world. The famous medical and surgical school of Varanasi, under the patronage of King Divodasa Dhanvantari, trained many eminent physicians and surgeons, including Susruta.

Khalifa Harun-ul-Rashid (7-8 century A.D.) invited a large number of Ayurvedic physicians to work in the hospital at Baghdad. The succeeding rulers of the Khalifate evinced keen interest in Ayurveda. The Muslim savant Al-Biruni had accompained Mahmud of Ghazni, who invaded India and stayed in India from 1017 to 1048 A.D. He learnt Sanskrit, and became well-versed in Indian astronomy and medicine through his discussions with *paṇḍits* and *vaidyas*. While describing the Indian medical literature, he has also mentioned the name of *Caraka* and his compendium, the *Caraka-Saṃhitā*, which had also been translated earlier into Arabic in the Khalifate in Baghdad . He has also described the origin of the tradition of Ayurveda from Brahma.

Unani Tibb

The system of medicine, which originated in Greece during the 5th-4th century B.C. and later developed by medical men in Arabian countries, was introduced into India by Arab and Persian invaders, but it flourished under the patronage of Mughal rulers. It has ultimately taken shape as one of the Indian systems of medicine, known as *Unani* Tibb, which may also be called the Greco-Arab system of medicine.

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Siddha Medicine

The Siddha system of medicine, attributed to the 18 Siddhas of Tamil Nadu, flourished, then as now specially in Tamil Nadu, while the Ayurveda was prevalent in all the other parts of India . The Siddha medical practices were in vogue in the early centuries of the Christian era, and the sage Agastya is stated to be the originator of this system. It may be noted that his name is found in different *Purāṇas*, both in Sanskrit and Tamil, although his exact identity cannot be established. In any case, Agastya cannot be a historical figure, who lived at a particular point of time. According to the *Rāmāyaṇa* (Treta yuga), Rama visited the ashram of Agastya in the course of his wanderings in the forest, and the latter appeared before Rama during the fight with Ravana, and taught him *Āditya-hṛdaya mantras* for achieving victory in that war of the triumph of good over evil. It appears that one sage Agastya remained mostly in South India, and he is the father figure of Tamil literature, culture and medicine.

However, there does not appear to be any dispute about the antiquity of the Siddha system. References to this system are found even in the works like *Thirukkural* and *Thirumantiraṃ*, which are devoted to various disciplines of Tamil civilization. It is believed that the Siddha medicine originated from Lord Śiva, and was passed on to His consort, Parvati, who in turn, taught it to Nandi, and thereafter to all the other Siddhars (for a history of Siddha medicine, see pp 29-35).

With this brief introduction to the three major Indian systems of medicine, an attempt has been made in this chapter to present a perspective on their medical aspects as well as their current status.

Ayurveda

The general meaning of Ayurveda is 'science of life'. This ancient Indian system of medicine has also spread to South-East Asia region, and even contributed in its own way to the development of contemporary medical system. Ayurveda deals extensively with effective measures for a healthy living during the entire span of one's life. It has also evolved a wide range of diagnostic and therapeutic measures to combat illness. Its principles of positive health and therapeutic measures are related to physical, mental, spiritual and social welfare of mankind. It may be emphasized that Ayurveda medicine deals comprehensively with both preventive and curative aspects of diseases, the twin goals which are identical with the concept of health adopted by World Health Organization in recent times.

Apart from its human health-care, there are other variations of Ayurveda, known as *Gajāyurveda* or *Hastyāurveda, Aśvāyurveda, Vṛkṣāyurveda,* etc. dealing with health and diseases of elephant , horse and trees, respectively, besides those of birds. There are well-known texts on these branches, like *Śālihotra Saṃhitā* concerning horses. However, in this chapter, our account will be limited to Ayurveda meant for human beings only.

According to the Hindu religio-philosophy, the universe is created by Lord Brahma. The origin of Ayurveda is also attributed to Him. According to a legend which has come

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down to us, Lord Brahma taught Ayurveda to Dakṣaprajāpati, who handed it over to Asvini-kumars, the divine physicians, who, in turn, taught it to Indra. When diseases began to affect the people, the sage Bhāradvāja was deputed by the other sages to obtain Ayurvedic knowledge from Indra, and this knowledge was passed on by Bhāradvāja to other *ṛṣis* like Ātreya.

Branches Of Ayurveda: In the beginning, Ayurveda was divided into two schools—physicians and surgeons. Later, it was further developed into eight branches of specialities, namely, (i) *Kāyacikitsā* (Internal medicine); (ii)*Śalyatantra* (Surgery); (iii) *Śālākyatantra* (Ophthalmology and E.N.T.); (iv) *Bhūtavidyā* (psychological and spiritual medicine); (v) Kumārabhṛtya (paediatrics, maternity and gynaecology); (vi) *Agadatantra* (toxicology); (vii) Rasāyanatantra (geriatrics); and (viii) *Vājīkaraṇa tantra* (eugenics and aphrodisiacs).

The eight branches of Ayurveda have been described in ancient classics like the *Caraka saṃhitā, Suśruta saṃhitā* and *Aṣṭāngahṛdaya.* Nevertheless, it was felt that there was a need for further addition in respect of these branches, based on the medical practices, during the medieval period and thereafter. Acharya P.V. Sharma in his work—*Ṣoḍaṣāngahṛdaya,* has added the following eight branches: (i) *Maulika siddhānta* (Basic principles); (ii) *Śarīram* (Anatomy and Physiology); (iii) *Dravyaguṇa* (Materia medica and Pharmacology); (iv) *Bheṣaja Kalpana* (Pharmaceutics); (v) *Rasa Śāstra* (Metallic and Mineral preparations); (vi) *Svastha Vṛtta* (Hygiene and Public Health); (vii) *Rogavijñāna* (Diagnostics and Pathology); and (vii) *Prasūtitantra* (Midwifery and Gynaecology).

Thus, Ayurveda now consists of 16 branches, which are being studied at graduate and post-graduate levels in Ayurveda. In ancient times, too, there were specialists of each branch, and many of their works have become authentic sources of these specialities like *Ātreya Caraka saṃhitā* for *Kāyacikitsā; Suśruta saṃhitā* for *Śālyatantra,* Nimi and *Nimitantra* for *Śālākya, Kaśyapa* and *Kaśyapa samhitā*, for *Kumārabhṛtya*, and the like.

Basic principles of Ayurveda: As noted in the earlier chapters, the basic concepts and theories of Ayurveda are fundamentally based on what are called the *pañcamahābhūtas* and *tridoṣa* principles. According to Ayurveda, all objects in the universe, including human body, are composed of five basic elements, namely, (i) *Pṛthvī* (earth); ii) *Jala* or Ap (water); iii) *Tejas* (fire); (iv) *Vāyu* (Air) and (v) *Ākāśa* (an ubiquitous element). It has been postulated that there is a balanced condensation of these elements in different proportions to suit the needs and requirements of different structures, and functions in the body matrix and its parts. Since the growth and development of the body matrix depend on its nutrition, the food is also regarded as being composed of the above five elements, which replenish or nourish the like elements of the body.

Tridoṣa: Both the physical and physiological processes in the human body, and the pathogenesis of various diseases and their symptoms, have been explained by the theory of *tridhātu* (in a balanced state) and *tridoṣa* (in a vitiated state), on the basis of three basic constituent complexes of the body, namely as *vāta, pitta* and *kapha. They* are not wind, bile and phlegm (as generally translated by some people), respectively. It should be noted that these are three primary principles which control the functions of the bio-

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motor force in the body, the metabolic activity, and the preservative functions. These three basic biological elements have been derived from the *pañcamahābhūtas.*

In brief, *vāta* is the motivating or dynamic principle, which governs the utilization of energy by various cells and organs for their anabolic as well as catabolic activities. It also controls the movements of *pitta* and *kapha*, and thus regulates all the functions and activities of the body. The states of enthusiasm, inspiration and expiration, voluntary actions like talking and walking, circulation of various fluids throughout the body, and the discharge from the body or its excretory products are attributed to *vāta,* according to the *Caraka saṃhitā.* There are five aspects of *vāta: prāṇa, udāna, samāna, vyāna* and *apāna.*

Pitta is that primal constituent of the living body the potential of which is that of *tejas* and the function of which is *sāttvic* as it is concerned with the production of those physical, and mental processes that are predominantly *sātvik* in nature. Its functions are concerned with vision, digestion, heat production, hunger, thirst, softness and suppleness of the body, lustre, cheerfulness and intelligence. Its presence is to be inferred by such mental phenomena as intellect, digestion, assimilation, healthy appearance, courage, fear, anger and lucidity. There are also five aspects of *pitta,* namely, *ālocaka, rañjaka, sādhaka, bhrājaka* and *pācaka.*

Kapha particles constitute the cellular as well as intra-cellular structure of the body, and maintain its internal environment. They also impart strength and stability to the body. The functions of *kapha* are concerned with the production of those physical and mental processes that are inferred from such mental phenomena as the exhibition of courage, forbearance, zest, vitality, knowledge, understanding, etc. The maintenance of the smooth-working of joints, integration of structural elements of the body are also intertwined with the actions of *kapha*. The five aspects of *kapha* are: *kledaka, avalambaka, tarpaka, bodhaka* and *śleṣaka.*

Doṣas are called *dhātus*, when they are within their physiological limits. When they are in a pathological condition vitiating the tissues and waste products (*malas*), the body is affected by their excess in their otherwise balanced specific activities, thus leading to the characteristic symptoms like pain, inflammation, phlegm, etc. Loss of function, convulsive movements, rise in temperature, burning sensation, loss of appetite, languidity and inertia are also indications of the aggravated *doṣas*. It has been postulated that *dhātus* or *doṣas* in the body, as a rule, exist at all stages of bodily development as well as degeneration, which are manifested by their characteristic signs and specific actions. They function in harmony and mutual cooperation in the maintenance of health, and are disturbed by unwholesome diet or undesirable conduct of an individual leading to all health. Thus, the concept of homeostasis (*dhātu-sāmya*) and disequilibrium (*dhātu-vaiṣamya*) occupies the pivotal position in Ayurveda.

***Prakṛti*:** Every individual has his particular constitution, which determines his biological functions and responses. This is known as *prakṛti* in Ayurveda, and is determined by the predominance of *doṣas* from the very beginning. *Samaprakṛti* or persons with equilibrium of *vāta, pitta* and *kapha* are the best, but they are a rarity. There may be persons with the dominance of any two *doṣas* together. The determination of *prakṛti* of a patient is

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necessary for prescribing appropriate medicines, diet and regimen. *Prakṛti* plays an important role in the pathogenesis, treatment and prognosis of various *doṣas*.

In addition to the *tridoṣa* based on the physical *prakṛti,* the psychosomatic conditions of a person are determined in relation to *rajas* and *tamas* which are mental *doṣas*. The physical and mental *doṣas* interact with one another, and are causative of physical and mental diseases. It is difficult to classify any disease as purely physical or mental, and mostly these are in combination in which one or the other might have dominance.

Concept of digestion and metabolism: *Pitta* in the form of *agni* (digestive power) is the basic factor on which the physiological digestion and metabolism are based. Conversion of eatables into assimilable substances and their subsequent further channelization into tissues are an integral part of this process. The basic factor responsible for digestion is called *pācakāgni,* which, based in *āmāśaya* (stomach and small intestines), supports seven *dhātvagnis* and five *bhūtāgnis* for the assimilations of food into *dhātus* or tissues, and ultimately into the five basic elements of the body.

Action of drugs: A large number of single drugs of vegetable mineral, metallic and animal origin have been described in Ayurveda. Either singly or in compound formulations, they are administered in proper dosages for maintaining better health as well as curing diseases. The basic theory of properties and actions of these drugs is based on five principles, namely, *rasa, guṇa, vīrya, vipāka* and *prabhāva*, inherent in each drug.

Rasa: According to Ayurveda, there are six different *rasas* or tastes, namely, *madhura* (sweet), *āmla* (sour), *lavaṇa* (salt), *kaṭu* (bitter), *tikta* (pungent) and *kaṣāya* (astringent). The Ayurvedic classics have given detailed descriptions of these *rasas*. The first three are antagonistic to *vāta*, and the last three, to *kapha*, while *madhura* , *tikta* and *kaṣāya* are antagonistic to *pitta*.

Guṇa: *Guṇas* are the attributes of various substances, and they are twenty in number: *guru* (heavy), *laghu* (light), *śīta* (cool), *uṣṇa* (hot), *snigdha* (soothing), *rūkṣa* (dry), *manda* (dull), *tīkṣṇa* (sharp), *sthira* (inert), *cala* (mobile), *mṛdu* (soft), *kaṭhiṇa* (hard), *visaṣa* (moistureless), *picchila* (mucilagenous), *ślakṣṇa* (smooth), *khara* (rough), *sūkṣma* (subtle), *sthala* (corpulent), *sāndra* (dense), and *drava* (fluid).

Vīrya: *Vīrya* is the potency of a drug, and is of two types: *uṣṇa* (hot) or *śīta* (cold). Some substances may also be *samaśītoṣṇa* meaning possessing a balanced proportion of both. Those which are *hot* are useful for the cure of diseases due to *vāta* and *kapha,* while those that are *cold* are beneficial for the alleviation of diseases due to aggravated *pitta*.

Vipāka: *Vipāka* is the consequence of the change of action, which a drug undergoes in the process of digestion and metabolism. The Ayurvedic texts have described three *vipākas*: *madhura* (sweet), *āmla* (sour) and *kaṭu* (bitter). Generally, substances with *madhura* and *lavaṇa rasa* are changed in the course of *vipāka* into *madhura* or *āmla,* while *āmla* and *kaṭu, tikta* and *kaṣāya rasa* substances are transformed into *kaṭu*. However, there are several exceptions also to this rule.

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***Prabhāva*:** *Prabhāva* is regarded as the final dominating influence or the active force or potential of a drug. The properties of *rasa, guṇa, vīrya* and *vipāka* sometimes may not lead to a specific action of the drug, but it may still be possible due to its *prabhāva*.

***Concept of Health and Disease*:** *Sāmya* (equilibrium) is *svāsthya* (health) and *vaiṣamya* (imbalance) is *roga* (disease). This may be of *tridoṣa, dhātu* and *malas* or waste products. According to Ayurveda, the definition of health is the balance of *doṣas*, proper *agni*, proper metabolism of tissues, and *malas* as well as happiness of soul, senses and mind. *Svāsthya* denotes positive health, while disease, its negation.

Philosophy of Ayurveda

Philosophy and science are inter-related. When philosophy is projected outwards, it becomes science, and science moving inwards finds its root in philosophy. All living organisms are a combined manifested form of nature and spirit; hence, medicine which is concerned with this state is an amalgamation of both philosophy and science. It is interesting to observe that, in an evolutionary manner, medicine was developed by philosophers not only in India, but also in Greece and China.

Right from the Vedic period, there has been the view that there is an eternal principle, which pervades the cosmos as well as the individual and it is of the nature of existence, consciousness and bliss. Though human body is of a phenomenal existence, the spirit within it is eternal and changes from body to body. When it enters a body, it is called birth and when it leaves the body, it is death. However, there have also been views quite contrary to it inasmuch as the existence of an eternal principle and of re-birth is not accepted by some thinkers, since there are other factors responsible for the act of creation.

It is worthy of note that Ayurveda, being secular, has incorporated all the views irrespective of their affiliation to Vedic or non-Vedic traditions, while explaining the physio-pathology of a living body. It may also be noted that some of the diseases are believed to have been caused by the misdeeds of one's past life, and are said to be curable by *daivavyapāśraya cikitsā* (spiritual medicine) only. Further, Ayurveda recognizes that perverted, negative and excessive use of one's time, intelligence and sense objects are the three-fold causes of both psychic and somatic disorders.

***Timely and untimely deaths*:** While answering questions concerning timely or untimely death, Atreya in the *Caraka Saṃhitā* has explained through an analogy: an axle fitted into a vehicle which is endowed with all the natural qualities carries on and perishes in time by the depreciation of its normal endurance; similarly, the life-span of a body of a person, though having strong constitution and managed carefully, reaches its end by the loss of its normal limit. Such a death is known as *timely*. On the other hand, the same axle gets destroyed on the way due to overload, uneven road, want of road, breaking of wheels, defects in vehicle or driver, separation of the bolt, or non-lubrication. Likewise, the life-span comes to an end even in the middle of one's life due to over-exertion, his diet being

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not in accordance with *agni*, irregular meals, complicated body postures, over-indulgence in sexual intercourse, company of ignoble persons, suppression of impelled urges, non-suppression of undesirable urges, infection with disease-producing organisms, poisonous winds, fire-injury or avoidance of good food and medicaments. Such a death is known as *untimely*. Even a death that would occur as a result of diseases, which are managed incorrectly, is regarded as being also *untimely*.

Rational view: Ayurveda adopts a rational attitude, and instead of believing blindly in any dogma or sect, it prefers to examine all the views and accepts whichever is useful. It is important to note that the *Caraka saṃhitā* always insists on *parīkṣā* or direct observation and examination. *Pramāṇas* are also termed in Ayurveda as *parīkṣā*. Apart from perception, inference and the authority known as *āptopadeśa,* Caraka accepts *yukti* as the fourth *pramāṇa*. *Yukti* means experimentally verified knowledge about the things produced by the plurality of causes, and it is effective at all times, and also subserves the purpose of *dharma, artha* and *kāma*. Although in his commentary on *Caraka saṃhitā*, Chakrapani Datta has interpreted *yukti* as conjecture and not a *pramāṇa*. Basically, *yukti* is a part of *anumāna* or inference.

Ayurveda maintains a balance between *daiva* (fate) and *puruṣakāra* (effort). There is an interesting dialogue in the *Caraka saṃhitā* (*Sūtrasthāna*, 10th chapter), between Maitreya and Atreya. The former observes that some patients, in spite of the availability of all medical material, having been looked after by physicians and attendants and possessing confidence and patience, are cured, while some others in similar conditions die. In other words, he states that therapeutic measures have practically no role. Ātreya, while refuting this theory, has explained that therapy is never impotent in respect of curable diseases. However, even in the case of a patient, who recovers without therapy, it is not correct to say that total therapy does not contribute to his recovery. For instance, when somebody helps a fallen person, even if he is able to get up, on his own, stands up more quickly and easily. Similarly, patients recover with the administration of total therapy. In the case of patients, who die even after due treatment, it should be noted that all diseases are not curable by therapeutic measures. A qualified physician, who is equipped with all the necessary materials, treats the curable diseases without fail and engenders normalcy to patients. The physician, who knows the classification of curable and incurable diseases and proceeds with their treatment in time, certainly succeeds.

Diagnosis

A person suffering from a disease is examined by an Ayurvedic physician in totality, i.e., taking into account his internal physiological characteristics as well as his mental status or disposition. He is thoroughly examined in the context of his affected *doṣas* and body tissues, the site at which the disease is located, his resistance and vitality, daily routine, and dietary habits, clinical conditions, digestive power, appetite and other social, economic and environmental situations.

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Specially, the following nine aspects are examined in detail:

i) *Prakṛti* (humoural constitution);
ii) *Sāra* (tissue vitality);
iii) *Sattva* (mental disposition);
iv) *Saṁhanana* (status of body built);
v) *Pramāṇa* (body measurement);
vi) *Abhyavaharaṇa* (power of ingestion);
vii) *Jāraṇa śakti* (digestive capacity);
viii) *Vyāyāma śakti* (physical capacity for exercise); and
ix) *Vayas* (age)

For the correct diagnosis of a disease, there are two types of examinations to be conducted, namely, (i) *rogiparīkṣā* (examination of the patient); and (ii) *rogaparīkṣā* (examination of the disease).

As for the examination of a patient, eight methods are employed, namely,

i) *Nāḍī parīkṣā* (pulse examination); (ii) *Mūtra parīkṣā* (examination of urine); (iii) *Mala parīkṣā* (examination of stool); (iv) *Jihvā parīkṣā* (examination of tongue); (v) *Netra parīkṣā* (examination of eyes); (vi) *Śabda parīkṣā* (examination of sounds); (vii) *Sparśa parīkṣā* (examination of touch); and (viii) *Ākṛti parīkṣā* (examination of structure).

Besides, for the proper diagnosis of a disease and for the determination of the pathological condition, the following five important aspects are adopted: (i) *Nidāna* (etiology); (ii) *Pūrvarūpa* (prodrome); (iii) *Rūpa* (signs and symptoms); (iv) *Upāśaya* (therapeutic suitability); and (v) *Samprāpti* (pathogenesis)

The mechanism, which determines the manifestation of a diseased state and the pathological signs or symptoms, are known in Ayurveda as *Kriyākāla*, which is involved in six stages of disease-process:

(i) *Sañcaya* : (etiological factor, which vitiates the humours, and produces quantitative as well as qualitative increase in the *doṣas);* (ii) *Prakopa*: (vitiated *doṣas* being further increased in quantity); (iii) *Prasāra*: (the spread of vitiated *doṣas* from their places to various parts of the body); (iv) *Sthānasamśraya*: (their blockage eventual at particular points, while spreading in the body through channels or *srotas);* (v) *Vyakti:* (the blockage or settlement in the channels of body tissues will manifest as pathological changes and signs, and symptoms of disease); (vi) *Bheda*: (the stage in which an abscess will burst or disease will disappear or the patient may die).

Treatment

As mentioned before, since the main objective of Ayurveda is the promotion and maintenance of health, prevention of disease and the cure of sickness, the basic approach is to adopt the right treatment, which promotes good health. In fact, he or she is the best physician, if he or she frees himself or herself from disease. Treatment of the diseases consists in avoiding factors responsible for causing disequilibrium of the body matrix or

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of any of its constituent parts, through the use of medicine, suitable diet, activity and regimen for restoring the balance of humours, and strengthening the body mechanism to prevent or minimize the future occurrence of a disease. Adoption of the triple measures, namely, medicine, diet and activity, is effected in two ways: one, the three measures antagonize the disease; or counteract the etiological and various manifestations of the disease; two, the same three measures are targeted to induce effects similar to the etiological factors of the disease-process.

For successfully administering a treatment, the following four components are actively involved:

(i) physician; (ii) medicament; (iii) nursing personnel; and (iv) patient. It is important to note that *physician* comes first in the order of importance. He should possess scientific knowledge, technical skill, and human understanding. He must exercise these qualities with humility, wisdom, and in a spirit of service to mankind. Next in importance come food and drugs. These are supposed to be in good supply, of high quality, wide application, efficacious, balanced composition, and useful for various pharmaceutical forms. The third, nursing personnel, should have a good knowledge of nursing, affection towards patients, dexterity, loyalty and cleanliness. The fourth component is the patient himself, who should be cooperative, obedient, fearless, and should provide honest information about his disease.

Preventive treatment

Ayurveda has provided a very vivid analytical description of the stages and events that take place from the initial operation of the causative factors to the final manifestation of a disease, resulting in an additional advantage of knowing the possible onset of disease much before the appearance of its clear symptoms. This rational approach enhances the preventive role of Ayurveda by making it possible to take proper and effective steps in advance to arrest the disease in its earliest stage itself.

Types of Treatment: Ayurvedic treatment is basically classified under two categories: *Samśodhana* (purification) and *samśamana* (pacification). In cases where the vitiation of *doṣas* is extensive and the patient is constitutionally strong, the purification, a radical treatment, is recommended. The pacification or palliative treatment is the choice, when the vitiation of *doṣas* is moderate and the patient is weak. There are five methods of purification known popularly as *pañcakarmas:* (i) *Vamana* (emetics); (ii) *Virecana* (purgative); (iii) *Āsthāpana vasti* (enema with medicated decoction, etc. without oil, *ghee* or fatty substance); (iv) *Ānuvasana vasti* (enema with medicated oil, *ghee* and other fatty substances); and (v) *Śirovirecana* (errhines).

If a surgical treatment is desired, *raktamokṣaṇa* (blood-letting) replaces *śirovirecana* as *pañcakarma. Snehana* (oiling) *and svedana* (fomentation) are pre-operations of *pañcakarma.* After purification treatment, a patient is to adhere strictly to a special dietary regimen known as *paścātkarma* or post-operative treatment.

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The pacification procedure consists of (i) *auṣadha* (medicine); (ii) *anna* (diet); and (iii) *vihāra* (regimen). These are further classified as follows:

i) *Dīpana*	(drugs promoting digestive fire);
ii) *Pācana*	(drugs helpful for digestion and metabolism);
iii) *Upavāsa*	(fasting);
iv) *Tṛṣṇānigraha*	(enduring thirst);
v) *Vyāyāma*	(physical exercise);
vi) *Ātapa*	(exposure to sun); and
vii) *Pravāta*	(exposure to air)

According to another type of classification, there are three categories of therapeutic approaches: (i) *daivavyapāśraya* (divine therapy); (ii) *yuktivyapāśraya cikitsā* (rational therapy); and (iii) *sattvāvajaya* (psycho-somatic therapy).

The first one deals with what are called the divine methods of treatment, such as wearing appropriate gems, worship and performing sacrifices. This therapy is a rarity now. The rational therapy is the main one, which includes purification and pacification treatments according to the conditions of the vitiating factors, while psycho-therapeutic procedure is advocated for the treatment of mental disorders.

There is another classification of treatment known as *santarpaṇa* and *apatarpaṇa*. The former is a supportive and nutritive treatment intended to restore the normal state of health of patients, who are weakened due to disease and treatment. The latter is intended to deplete the patients by medicine and rough diet whenever the situation demands such an action.

Social hygiene

It must be emphasized, at this stage, that the Ayurveda attaches great importance to social hygiene. Matrimonial relation among close relatives is prohibited according to Ayurveda, to avoid genetic abnormalities. Special diet and nutrient drinks are recommended before and after sexual relations. Likewise, carefully planned diet and regimen during pregnancy for women as well as special care for mother and child during post-natal period are also advised. The importance of breast-feeding the new born is strongly recommended in Ayurveda, which has been adopted by modern science only recently.

The spread of infectious diseases from one to another by direct contact with respiratory air, sexual intercourse, body touch, taking unwholesome food together, sleeping together, wearing clothes of infected persons, etc. have been explained in Ayurvedic texts, specially in the case of diseases like leprosy, fevers, tuberculosis, conjunctivitis and several other infectious diseases. Patients of smallpox or other communicable diseases are advised segregation to avoid contamination. The *Caraka saṃhitā* has devoted a full chapter to epidemic diseases caused by contaminated earth, water and others. The method of purification of each of them has also been described in detail.

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There is another theory that all diseases occur due to abnormalities in *kāla* (time), *artha* (mind), and *karma* (action). Excessive heat, cold and rain in summer as well as winter and rainy seasons are examples of improper time, when adequate care has to be taken to maintain one's health. Lack of intellect, restraint, will-power and memory are improper functioning of mind, known in Ayurveda as *prajñāparādha.* These produce mental as well as physical diseases. It is recognized that diseases are also produced due to excessive or deficient use of sense organs. Various factors known in Yoga as *yama* and *niyama* are included in Ayurveda under *sadvṛtta* or good conduct, which promotes social hygiene and individual health.

Physical health

It may be reiterated that preservation of health of the healthy persons is the first objective of Ayurveda. This can be achieved by simple but natural means of regulating everyday, night and seasonal routine, according to the nature and environment as described in Ayurveda. It is also necessary to restrain sense organs from their contact or interaction with unwholesome objects.

Everyday routine includes early rising, timely urination and passing of stools, dental care, care of mouth and tongue, gargles for the care of throat, massage, nasal drops, shaving, exercise, etc. Night routine comprises proper sleep and sex involvement as per norms. Seasonal routine as described in Ayurveda is very interesting. In India, the main seasons can be divided into three: winter, summer and rainy, which are further divided into six seasons or bi-monthly periods. Diet and regimen for each season, which may be good for the maintenance of proper health during that period, has been described in Ayurvedic texts . Things or situations, which may lead to difficulties during these periods, have been mentioned and these should be avoided at any cost for better health care. A person, who strictly observes these regulations, is expected to develop immunity to seasonal diseases and epidemics, and thus lead a long healthy life.

Ayurveda describes three pillars of health i.e. *āhāra* (diet), *svapna* (sleep), and *brahmacarya* (celibacy). Wholesome food articles under all conditions for all persons are necessary. There are eight aspects related to foodstuffs, their natural qualities, preparations, combination, quantity, habitat, season or period, dietic regulations and constitutional requirements of individuals, which have been given due importance. Timely sleep for a required period is also essential for the maintenance of good health. The total requirement of sleep differs age-wise. Likewise, celibacy or avoiding sexual intercourse is also very important. More sexual indulgence results in the shortening of life.

Mental health

Mental perversion (*prajñaparādha*) is one of the important causes of physical and mental disorders. Life of an individual is guided and controlled by mental factors. Hence, mental health with intellect and memory is a primary consideration for the prevention of diseases.

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Indulgence in bad thoughts and habits should be avoided. Emotional and psychological disturbances must be discarded for the prevention of diseases. High standard of morality has also an important place in Ayurveda. The following are among the *acts* of sin relating to body, speech and mind: (i) *Hinsā* (violence); (ii) *Steya* (stealing); (iii) *Anyathākāma* (unnatural lust); (iv) *Paiśuṇya* (back-biting); (v) *Pauruṣa* (harshness); (vi) *Anṛta* (telling lies); (vii) *Sambhinnālāpa* (idle talk); (viii) *Vyapad* (hurting others); and (ix) *Dṛgviparyaya* (wrong viewpoint).

One should always try to abandon these detrimental factors. There is no denying that ethical conduct is equally important. Persons should render help according to their capacity to those, who do not have any means of livelihood and those who are afflicted with disease and grief. One should always remember the help one has received from someone else, and try to help even one's enemy if the occasion so demands. One should have the same attitude in prosperity as well as in calamity. One should talk at proper time what is correct within limits, and should not be argumentative, and one's words should be sweet and charming. One should not also disclose to others about his enmity with a particular person. In general, one should not do anything, which is valueless in terms of religious merit, economic prosperity or personal desire. One should also reflect sympathy and kindness to others, always restrain the evil urges of the body, speech and mind, provide gifts to others to the extent possible. These are the good conducts, by the strict observance of which one's life span is extended; health, prosperity and fame are attained.

Preventive medicine: Preventive medicine envisages environmental sanitation as well as the augmentation of the resistance to a host of diseases. Immunity of a person is termed as *bala,* and natural immunity, as *sahaja bala.* Increasing the *bala*, while treating the diseases, results in decreasing the pathogenic conditions. Therefore, the use of *rasāyana* (rejuvenating compositions) along with other treatments may be very helpful for curing diseases also. The use of oxides (or *bhasmas*) of gold, silver, mercury, etc. in most of the *rasa* preparations appears to be from this angle. Among the drugs of vegetable origin, *brāhmī* (*Bacopa monierri*) *Manḍūkaparṇi* (*Centella asiatica*) and *Śaṅkhapuṣpī* (*Convolvulus pluricaulis*) have been found to improve intelligence and memory. *Āmalaki* (*Emblica officenalis*) and *hārītakī* (*Terminalia chebula*) arrest the process of premature ageing. *Guḍūcī* (*Tinospora cordifolia*), *śilājatu* (*bitumen*), *aśvagandha* (*Withania somnifera*), *bhṛngarāja* (*Eclipta alba*), *punarnava* (*Boerhaavia diffusa*) and others are considered as general *rasāyanas,* which play an important role in providing the non-specific type of immunity if properly used.

Unani System of Medicine

Basic concepts—four humours: The basic framework of Unani comprises the four humoural theory of Hippocrates. Humours (*akhlat*) are the fluids, which the human body obtains from food and include in modern parlance the various hormones and enzymes. The four humours are—blood; phlegm; yellow bile; and black bile, which are regarded as being responsible for maintaining the moisture of different organs of the body, and also

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providing nutrition to the body. According to Unani, food passes through four stages of digestion, namely, (i) gastric digestion, when food is turned into chyme and chyle, which is carried to liver by menentric veins; (ii) hepatic digestion in which chyle is converted into four humours in varying quantities, that of blood being the largest. Thus, the blood which leaves the liver is inter-mixed with the other humours, namely, phlegm, yellow bile and black bile; (iii) vessels; and (iv) tissue digestion accomplished in vessels and tissues.

While the humours are flowing in the blood vessels, every tissue absorbs its nutrition by its absorptive power, and retains it by its retentive power. Then, the digestive power in conjunction with assimilative power, converts it into tissues. The waste material at this stage is excreted by the expelling power. According to Unani system, when any disturbance occurs in the equilibrium of humour, it causes disease. The treatment, therefore, aims at restoring the humoral equilibrium.

***Basic components of the body*:** In the Unani, human body is considered to be made of the following seven components, each having a close relation to and direct bearing on the state of health of an individual. The seven comprehensive components are: (i) *Arkan* (elements); (ii) *Mizaj* (temperament); (iii) *Akhlat* (humours); (iv) *Aḍa* (organs); (v) *Quwa* (faculties); (vi) *Afal* (functions); and (vii) *Arwah* (pneuma or vital spirit).

***Elements*:** Elements, which are four in number, denote the different states of matter and materials entering into or forming a part of everything in the universe, and each one of them has its own temperament as shown below:

	Element		*Temperament*
(i)	Air	....	hot and moist
(ii)	Earth	....	cold and dry
(iii)	Fire	....	hot and dry
(iv)	Water	....	cold and moist

***Temperament*:** Temperament occupies a very important place in Unani system, and forms the basis of its concepts of pathology, diagnosis and treatment. Each individual is supposed to have a characteristic temperament, which is evaluated in terms of the Galenic concept, as being sanguine, phlegmatic, choleric or melancholic, according to the respective preponderance of the humours. In other words, the temperament of an individual is related to the uniqueness of an individual. This can be explained in modern terminology as psycho-neuro-endocranial system with its orientation tempered differently in each individual. Any change in his temperament brings about a change in the person's state of health. Temperaments are also assigned to drugs in Unani, and there are degrees of such temperaments. The temperament of a given drug is assessed by its action on the temperament of the body itself. Thus a drug which is regarded as being *hot* means that when it enters the body and interacts with the vital faculties, it produces a temperament which is *hot*. Hence drugs are principally used to correct the abnormal pathological temperament of the body itself or of any particular organ.

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Organs: These are the various organs of the human body. The healthy and diseased condition of each individual organ affects the state of health of the whole body.

Spirits: These are considered to be the life-force, and carriers of different powers. They are, therefore, considered as important in the diagnosis and treatment of diseases.

Faculties: These are of three kinds: (i) Natural power ; (ii) Psychic power; and (iii) Vital power. The first one is that of metabolism and reproduction. Liver is the seat of this power, and the process is carried on in every tissue of the body. Metabolism is concerned with the processes of nutrition and growth of human organism. Psychic power refers to nervous and psychic faculty, which is located inside the brain, and is responsible for perceptive and motive power. The former conveys impressions or sensation, while the latter brings about movements in response to sensation. Vital power is responsible for maintaining life and enables all the organs to accept the effect of psychic power, which, according to Unani, is located in the heart and keeps life running in the tissues.

Functions: This component refers to the movements and functions of all organs of the body. In the case of a healthy body, the various organs not only keep themselves in proper shape, but also perform their respective functions properly. This makes it necessary for an Unani physician to have full knowledge of the functions of human body in all its details.

Concept of preventive medicine and self-care

The basic philosophy of Unani system is that the body which is admittedly composed of matter and spirit is taken as a whole, because it postulates that harmonious life becomes possible only when there is a proper balance between the physical and spiritual functions. In other words, the restoration of human body as a whole to its original state is the basic objective of the system as in the other traditional systems like Ayurveda . Unani system rightly emphasizes the need for keeping water, food and air free from pollution, and it also has laid down the following *six* essential prerequisites for the promotion of health and prevention of diseases: (i) Air; (ii) Food and drinks; (iii) Body movement and repose; (iv) Psychic movement and repose; (v) Sleep and wakefulness; and (vi) Evacuation of the undesirable, and retention of the desired ones.

Pure air and environment are considered as most necessary for health. Avicenna, the famous Arab physician and authority on Unani, has pointed out that the change in environment relieves a patient of many of his diseases, besides emphasizing the need for keeping the water free from all types of impurities. Exercise as well as rest is considered necessary for maintaining good health; for, it is well recognized that exercise helps the growth of muscles and ensures nutrition, and also increases blood supply and proper functioning of excretory system, besides keeping the heart and the liver in good condition.

An interesting aspect of the Unani system is that it documents extensively the impact on health of such psychological factors as happiness, sorrow, anger, etc. There is a branch of this medicine known as psychological treatment which deals in detail with this topic.

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Normal sleep and awakening are considered essential for good health. Sleep provides physical and mental rest. Its inadequacy causes loss of energy, mental weakness and digestive disturbances. Proper and normal functioning of the excretory processes are necessary for keeping good health. If the waste products of the body are not completely excreted or when there is disturbance in the normal excretory functioning, it leads to diseases of several types.

Diagnosis

The diagnostic process in Unani medicine is obviously dependent upon careful observations as well as physical examination. Any illness of a person is to be regarded as a product of (a) the stuff or material he is made of; (b) the kind of temperament, structure and strength of faculties he possesses; (c) the nature of factors operating on him from outside; and (d) nature's own potential to maintain his physical functions, and to ward off all disruptions to the possible extent. All inter-related factors are kept in view, while determining the cause and the nature of illness, and determining the line of treatment. Diagnosis involves the investigation of the causes of diseases in detail and, for this purpose, Unani physicians depend mainly on pulse reading as well as the examination of urine and stool. The alternative contraction and expansion of the arteries, produced by the systole and diastole of heart, is called pulse. In the Unani, the ten conditions of pulse observed during the diagnosis are:

(i) quantity; (ii) force; (iii) duration of movement; (iv) condition of the vessel wall; (v) volume; (vi) duration of the rest-period; (vii) palpitation of the pulse; (viii) equality and inequality; (ix) balance of the pulse; and (x) rhythm.

Physical examination is carried out for the diagnosis of urinogenital disorders, pathogenesis of blood and other humours, metabolic disorders and liver diseases. The examination of urine relates to its (i) colour; (ii) consistency; (iii) clearness and turbidity; (iv) odour; (v) foam or froth; and (vi) quantity. The examination of stool also helps very much in the diagnosis of various diseases.

Therapeutics

After the diagnosis of a disease in a patient, the prescriptions are given to him with the legend 'Howash Safi' (God is the healer), generally in Persian language, with detailed instructions about the dosage and the preparations of medicine. The entire personality of a patient is taken into account—his physique, make-up, self-defence mechanism, reaction to environmental factors, likes and dislikes—while prescribing medical care.

The main types of treatment of Unani medicine are: (i) regimental therapy; (ii) dieto-therapy; (iii) pharmaco-therapy; and (iv) surgery.

Regimental therapy: The important techniques in regimental therapy, along with the ailments for which they are considered effective, are: (a) *Venesection* : This method of

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treatment has been found very effective in the cure of certain diseases in order to (i) correct the excess of blood and relieve off high blood pressure; (ii) prevent toxicity and accumulation of waste matter in blood; (iii) induce excretion of waste matters from various parts of the body; (iv) stimulate metabolic processes; (v) cure ailments due to certain menstrual disorders; and (vii) correct *hot* material in temperament. (b) *Cupping*: This method of treatment is used for: (i) cleaning the skin off waste matters; (ii) stopping excessive menses or epistaxis; (iii) correcting liver diseases; (iv) treating malaria and spleen disorders: and (v) treating piles, inflammation of testes, uterus, scabies, boils, etc.; (c) *Sweating* : Waste matter from skin, blood and from the other parts of the body is excreted through the natural process of sweating. It helps in reducing excessive heat. Dry or wet fomentations, bath with warm water, massage and keeping the patient in a room having hot air, are some of the practical methods of diaphoresis; (d) *Diuresis* : Poisonous matters, waste products and excess of humours are excreted through urine. Diuresis is carried out as a cure for the ailments of heart, liver, and lungs. Sometimes, it is effected by keeping the patient in a cold room and applying cold water on to him; (e) Turkish *Bath* : This is recommended for (i) resolving the waste matters and increasing sweating; (ii) applying light heat; (iii) increasing digestive power and the like. Cold Turkish bath is preferable for normal healthy persons, while hot bath is generally given for curing afflictions like paralysis and muscular pains, after massage; (f) *Massage*: Soft massage is sedative and relaxant; dry and hard massage is deobstruent and increases blood supply while the massage with oil relaxes muscles and softens the skin; (g) *Counter-irritation* : This technique provides relief in cases of pain, burning sensation and irritation. It also helps reduce inflammation and heals tumours; (h) *Cauterization* : It prevents the poisonous malignancy of one organ from transferring it to other organs. In case of pain of hip joint, this technique is found very useful. By this technique, the pathogenic matters which are attached to some structures are either removed or resolved; (i) *Purging* : Unani medicine widely uses purgatives for intestinal evacuation. There are prescribed rules for using this method, which influences normal metabolic process; (j) *Vomiting*: Emetics are used for curing headache, migraine, tonsillitis, broncho-pneumonia or bronchial asthma. These are also intended to cure mental diseases like mania and melancholia; (k) *Exercise* : Realizing the importance of physical exercise for the maintenance of health, strengthening digestion and treating certain types of diseases, Unani system has prescribed rules, timings and conditions for various types of exercises; (l) *Leeching* : This method, which is employed for removing deleterious matter from the blood, is useful in curing skin diseases and ring-worms. Specific conditions have been described for its application.

Dietotherapy: Unani, like the other systems of medicine, firmly believes that food plays a key role in the maintenance of health as well as in curing diseases during treatment. By regulating the quality and quantity of food, several ailments are treated successfully. There are several published books on Unani, which deal with the subject of diet in relation to specific diseases. Certain food items are considered to be laxative, diuretic and diaphoretic. Eating specific organs of animals has also been prescribed as a treatment for diseases in the corresponding organs of human beings.

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Pharmaco-therapy: This type of treatment involves the use of natural drugs, mostly herbal, though drugs of animal and mineral origin are also used. Natural drugs are preferred to the synthetic ones, because they are locally available and have far less after-effects on the body. Unani medicine presupposes, as noted before, that the drugs also have their own temperament. Since, in this system, stress is laid on the particular temperament of an individual, the medicines administered are such as would go well with the temperament of the patient, thus accelerating the process of recovery, and also eliminating the risk of reaction. Drugs are supposed to act by their temperament of being *hot, cold, moist,* and *dry*. As a matter of fact, drugs are classified into four classes, according to their temperament . It should be noted that, in prescribing drugs, relevant factors of its temperament as well as potency, age and temperament of the patient, nature and severity of the disease, are taken into consideration by Unani physicians. Drugs are used in the form of powders, decoctions, infusion, tablets, etc. The Unani system has also set rules for prescribing alternative drugs.

Surgery: This therapy is of very limited use, although the Unani system is credited to be a pioneer in this field, and has developed its own instruments and techniques. At present, only minor surgery is in use in this system.

Siddha system

Siddha system of medicine, one of the oldest, and which continues to flourish specially in Tamil Nadu (South India), seems to have been fostered and developed by sages of ancient times. The term, *Siddha*, means 'perfected' or 'achievement'. The Siddhars were saintly, and achieved results in medicine through the practice of yoga and related meditational experiments. According to Tamilian tradition, eighteen Siddhas have made great contributions towards the development of this system. Their names are:

Agastyar; Agappayan; Azugani; Bogar; Idikkadar; Kalangi; Karurar; Konganavar; Kutambai; Nandi; Pambattai; Pulasthiyar; Pulippani; Punikannar; Punnakkisar; Sattainathar; Theraiyar; and Thirumūlar.(see also the chapter on Siddha medicine in this volume).

Agastyar is considered to be the *guru* or tutelar-head of all Siddhas. His works on medicine and surgery are still considered to be unique for their speciality. He is honoured not merely as an eminent physician, but also as an outstanding scholar, philosopher and linguist. In the absence of relevant source materials, it is difficult to pinpoint the period during which the Siddha system originated. Probably, Siddha medicinal practices were in vogue around 4th -5th cent A.D., and flourished in the medieval period.

Basic principles: The principles and doctrines of this system, both fundamental and applied, have a close similarity to the *Rasaśāstra* and the *rasāyana* treatments of Ayurveda. Siddha system also subscribes to the doctrine of *pañcamahābhūta, tridoṣa* theory and *saptadhātus,* but not in such an elaborate manner as Ayurveda does. While in Ayurveda, age-wise predominance of *kapha* is in childhood and *vāta* in old age, Siddha system

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believes in the dominance of *vāta* in childhood, and *kapha* at old age. The Siddhas argue that activity, growth and sharpness of functions of senses and other organs are greater in early life than in the later life, and this could be possible only if the nervous functions are dominant, whereas in old age there is a diminishing activity of the various organs and limbs, which shows that the influence of *kapha* is more during this age in comparison to *vāta*.

***Materia medica*:** The literature (which is in Tamil) of Siddha system is quite considerable, and provides an insight into its materia medica. To promote proper health of the common people and cure them from their illness are the basic objectives of all the systems of medicine. The Siddha system has, in addition, a transcendental motivation towards achieving immortality of the body. The Siddhars' innate desire was to have a perfect and immortal body through meditation as well as medicine. In tune with this approach, they endeavoured to develop drugs, and were attracted to materials which would not perish by themselves. They believed that the body cells which atrophy every day should be continuously replenished. When the process of the loss of cells overtakes the process of repair, the body naturally becomes incompetent and old. If the wastage and loss could be arrested, there would be no need for replenishment. It would appear that there are medicines claimed to have been found by the Siddhas, which could arrest the degeneration of cells. The Ayurvedic *vaidyas* have also endeavoured in this direction through geriatrics or *rasāyana* drugs. The materia medica of Ayurveda, however, consists largely of drugs of vegetable origin though lately it has included some drugs of mineral and metallic origin. On the Other hand, in the Siddha system, drugs of metallic and mineral origin are mainly used, while drugs of vegetable origin are secondary. But it should be noted that the metals and minerals are elaborately processed with a number medicinal plants, before they assume the names of Siddha drugs.

Apart from the division into vegetables, animal, metal and mineral categories, Siddhas have also classified drugs under the following six categories: (i) *Uppu* (salts) : These are evidently water-soluble inorganic compounds, which either give off water of crystallisation or decompose when ignited; (ii) *Paṣāṇaṁ* (toxic substances): This group includes inorganic compounds, which do not dissolve in water or decompose on ignition; (iii) *Uparasaṃ* (auxiliary substances): This group of drugs, though chemically similar to *paṣāṇaṁ*, differs in their drug action; (iv) *Lohaṃ* (metals and metallic alloys): These do not dissolve in water, but 'liquefy' when put into fire, and solidify on cooling; (v) *Rasaṃ*: This group consists of mercury and its compounds, arsenic, etc, which sublime on heating. (vi) *Gandhakaṃ* (sulphur): This is insoluble in water, but burns when ignited. Siddha physicians claim that specially prepared mercury and sulphur do not burn or give out vapours or sublime when heated on fire, and such preparations are called *kaṭṭu* by Siddhas, meaning that the constituents have been bound.

Siddhas use mercury in five forms as follows: (i) mercury in its metallic form, but purified; (ii) red sulphide of mercury; (iii) mercuric chloride; (iv) mercuric sub-chloride; and (v) red oxide of mercury. These are known, as *rasaṃ, liṅgaṃ, vīraṃ, puraṃ* and *rasacenduraṃ* respectively.

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Siddhas have also classified certain other inorganic drugs as *nāda* and *bindu*. They are supposed to have natural affinity to each other, and their combinations are more powerful than the individual drugs. For example, borax (*vengaraṃ*) is considered *nāda*, and ammonium chloride or sulphate (*navasāraṃ*) as *bindu*. This concept of *nāda-bindu* is peculiar to the Siddha system. Another important classification of drugs is in terms of *śatru* (enemy) and *mitra* (friend), which is based on the possible mutual interaction of drugs. The modern equivalents for these terms are compatible and incompatible of drugs. Incompatibility of drugs can occur in taste (*rasa*), attributes (*guṇa*) or in potency (*vīrya*). There cannot be incompatibility in the ultimate assimilation of the drug known as *vipāka* stage.

Preparation of medicine

The metallic preparations of Siddha are known by different names such as *parpaṃ*, *cenduraṃ*, *cūrṇaṃ*, *karuppu*, *mezhugu*, etc. They also use (*cūrṇaṃ*) powders, decoctions (*kvāthaṃs*), and others of vegetable origin. A Siddha variation in the pharmacy of *bhasmas* (incinerated metallic preparations) is the preparation of *cunnaṃs* from certain metals and minerals. *Cunnaṃ* means calcium oxide or hydroxide—a strong alkali, which causes blisters and inflammation of the mucous membrane.

But Siddha physicians have described a test for *cunnaṃ* preparations. If the *cunnaṃ* is mixed with turmeric powder and water, the mixture becomes red. If the *cunnaṃ* is properly processed and the compound consists wholly of carbonates, the test is negative. Such a *cunnaṃ* is more powerful than the *bhasma* in its therapeutic action. *Kaṭṭu*, as noted before, is another speciality of Siddha pharmacopoeia, and means that which has been 'bound' or obstructed from subliming or burning itself into fumes. Mercury, sulphur and mercurial compounds are some of the drugs, which are made heat-resistant through special methods of preparation. While these drugs are on fire, certain juices are poured on to them drop by drop. The *kaṭṭus* can be kept indefinitely and administered in small doses for specific diseases.

Muzhugu is another type of preparation used in the Siddha system. It is waxy in consistency, and the preparations under this category contain a number of drugs of both metallic and mineral origin.

There are descriptions of 25 kinds of salts, 120 auxiliary substances (*uparasas*), 64 toxic ones (*pāṣāṇas*), 11 types of metallic mercury, and its by-products. Besides, about 1200 plants, and some drugs of animal origin also constitute the Siddha pharmacopeia.

Diagnosis

The famous text *Tirukkural* has described what are called *noi nadal, noi mudal nadal, attu, tannikkaṃ noi nadal valappa ceyal.* The words *noinadal,* and *noimudal nadal,* indicate an approach to the process of diagnosis. A Siddha physician investigates the cause of disease, the prodromus, signs and symptoms, complications and pathological changes. In this

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approach, the body and the disease are considered as one entity to arrive at a conclusion regarding the condition or diagnosis of a patient. The diagnosis itself is based on the following eight entities: (i) *Nāḍī* (Pulse); (ii) *Nāku* (Tongue); (iii) *Nīraṃ* (colour); (iv) *Moozhi* (voice); (v) *Kaṇ* (eyes); (vi) *Sparśaṃ* (touch); (vii) *Malam* (faeces), and (viii) *Mōtiraṃ* (urine).

In Ayurveda, these are known as *aṣṭasthāna parīkṣā*. Thus, there is a similarity in this respect in both the systems.

Pulse examination or *nāḍī parīkṣā* is common to Ayurveda (though not during the ancient period), Unani and Siddha systems. Perhaps it is common to all oriental systems, since it was practised by Chinese, Korean, and Vietnamese also. It is a science as well as an art. Perfection in this type of diagnosis depends upon the power of concentration and observation of a physician. While some physicians claim prefect diagnosis only in *nāḍī parīkṣā*, many others feel that this may not be sufficient by itself as a diagnostic tool. However, even now, there are some practitioners of Ayurveda, Siddha and Unani, who appear to have attained perfection in pulse examination and, in most of the cases, significantly, their pulse diagnosis has been found to be correct.

There are some physicians, who depend for diagnosis only on urine examination. .However, it would be proper for perfect diagnosis to examine the aforesaid eight before they arrive at their definitive conclusion.

Principles of treatment

It may be observed that, like Ayurveda, the Siddha system has, in course of time, developed eight branches under more or less similar nomenclature to that of Ayurveda, namely, (i) *Kāyacikitsai* (General medicine); (ii) *Bālacikitsai* (Paediatrics); (iii) *Grahacikitsai* (Mental and neurological diseases); (iv) *Ūrdhvāṅgacikitsai* (Ophthalmology & E.N.T.); (v) *Śalyacikitsai* (Surgery); (vi) *Viṣacikitsai* (Toxicology); (vii) *Rasāyanaṃ* (Geriatrics); and (viii) *Vājīkaraṇam* (Aphrodisiacs)

However, the literature on some of the above branches of Siddha system is rather inadequate. Nevertheless, general medicine, paediatrics, toxicology, ophthalmology and geriatrics are mostly in practice with noticeable theoretical as well as practical knowledge in these branches. There are several medicines for the treatment of diseases, and conditions like fever, diarrhoea, piles, cough, abdominal disorders, etc. The emphasis is, however, on the positive health, and the object of Siddha system, like the Ayurveda, is to prevent disease by careful dieting and the relaxation of body and mind.

Further, as in Ayurveda, *samśodhana* (purification) and *samśamana* (pacification) types of treatment are also followed in Siddha medicine as required. The *Samśodhana* treatments are known as (i) *vānti* (emetics); (ii) *bhedi* (purgative); (iii) *pichu* (enema); (*ennai pichu* with medicated oil, and *maruntu pichu* with decoction, etc.) and (iv) *nasyaṃ* (errhines). Oil massage and fomentation, as in Ayurveda, are also prescribed when needed.

In the Siddha medical texts, there are detailed descriptions of diseases of children and their special treatment. The text *Magatunoigal,* describes diseases of women and their

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treatment. Though there are no separate texts for anti-natal and post-natal complications, medicines for these conditions have also been described. The Siddha system also provides extensive information about diseases of eyes and their treatment known as *nayana naigal*; as many as 96 eye diseases have been dealt with in some Siddha texts. The treatment of mental disease has also been well described in some of them. Preparations, like *peranda parpaṃ,* are specific for the cure of mental diseases.

There is a mention about *tokkaṇaṃ* and *varmaṃ* in Siddha texts. The former deals with 12 varieties of oil used in the form of five methods for *vāta* diseases similar to *Navarkizhi pizhical* in Ayurveda.. There are numerous references to *varmaṃ* in the texts like *Varma kannadi, Varmaṇi* and *Varma sutiraṃ*. *Varma* is known in Ayurveda as *marma,* and there are 108 *marmas* described in both the systems. The meeting places and special points in the body are known as *marmasthāna* in Ayurveda, as in the Siddha. If a person gets injured in one the *varmas,* it is considered dangerous to life. The *varmaṃ* treatment is similar to acupuncture of the Chinese system. This treatment is also practised in Siddha medicine, and such practitioners are called *Varmaṇi*.

Apart from the therapeutic aspects, the Siddha system also deals with *kāyakalpam, prāṇāyāmaṃ, yoga muppu, rājayogaṃ,* etc. A person can attain a state of deep meditation by the practice of *rājayogaṃ* and *prāṇāyāmaṁ*. By *Kāyakalpaṃ,* the process of natural ageing can be avoided. It is believed that some of the Siddhars lived for thousands of years by practising *kāyakalpaṃ, rājayogaṃ* and the like.

Ayurveda: its decline and revival

In the history of Ayurveda, one also notices its decline to some extent despite its solid foundation of sound principles, rational methods of examination of diseases, and effective therapeutic management. Among the causes for its decline, special mention needs to be made of the following:

(i) Though medical service was an important vocation of Buddhist missionaries, Ayurvedic surgery declined considerably in view of the Buddhist *ahimsā* (non-violence) doctrine. Surgeons also depended on barbers and others for conducting surgical operation;

(ii) During the 13th century A.D., the famous library of Nalanda was burnt by the soldiers of Bakhtiyar Khilji, and thus an important treasure of Ayurvedic literature was destroyed;

(iii) The patronage of Ayurveda was left to small jagirdars and individual physicians, and the patronage at an all-India level declined during the Muslim rule;

(iv) Ayurvedic colleges and other educational establishments were practically closed due to the governmental non-patronage, and the institutional teaching was reduced to *guru-śiṣya paramparā* (preceptor-disciple tradition);

(v) In the medieval period, hospitals were closed due to financial constraints, and reduced to individual consultations;

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(vi) The British regime did not accord any status to Ayurveda which, as a result, stagnated with the introduction of western medicine, which was patronized by the British, and it began to take roots in India; and

(vii) The mood of Indians was divided in two opposite directions. Those who were friendly with the foreign rulers adopted western science, including medicine and cultural habits. Many others, however, directly or indirectly, opposed this, and several conservative *vaidyas* in this process became dogmatic and impervious to modern advances in medicine; nor did they update it to meet the contemporary requirements.

Efforts for revival

Earnest attempts were, however, made to resuscitate Ayurveda, specially from the beginning of the 20th century. There was a joint collaboration of leaders of Independence Movement with Ayurvedic experts, and an All-India Ayurvedic Congress was established in 1907. Soon, this Congress started its teaching wing-the All India Ayurveda Vidyapeeth, which formulated certain courses of Ayurveda. It was not long before several Ayurvedic schools were opened all over the country, thus promoting the teaching of Ayurveda. In 1920, the Indian National Congress adopted a resolution for the revival of Ayurveda, and reiterated this resolution at its session held in 1938.

Pandit Madan Mohan Malaviya established the Benaras Hindu University (1919), as a constituent of which an Ayurvedic college was started. Soon, Hakim Ajmal Khan established the Ayurvedic and Unani Tibbia College (1921) in Delhi. Swami Shraddhanandji also started an Ayurvedic School in Gurukul Kangri near Hardwar (1922). Thereafter, many Ayurvedic institutions came into being in various states adopting a new teaching pattern 4½ to 6½ years' regular institutional training with arrangements for practical training in attached hospitals, pharmacies and medicinal gardens. Modern medical courses were included in the curricula of these institutions, too.

Bhore Committee

The Bhore Committee was appointed by the Government of India (1947) to review the medical facilities available in the country, and to recommend mechanisms for their proper utilization. Nevertheless, this Committee, more or less, side-tracked the matters relating to Indian Systems of Medicine and left them to the provincial governments to decide what role, if any, should be played by the indigenous systems in the organization of public health measures as well as medical relief to the patients. The only positive suggestion of Bhore Committee related to the establishment of a Chair of History of Medicine in the All India Medical Institute to study indigenous systems of medicine with a view to investigating the extent to which they can contribute to the medical knowledge as a whole in the national interest.

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Chopra Committee

The First Health Ministers Conference, held in 1946, a year before Independence, discussed in detail the utility of indigenous systems of medicine and passed a resolution to the effect that attempts be made towards training and research in indigenous systems of medicine, and that the practitioners of Ayurveda and Unani should be absorbed into the State Health institutions. As a result, a Committee under the chairmanship of the late Sir Ramnath Chopra was appointed in the same year by the Government of India. This Committee considered the matter thoroughly and submitted its recommendations in 1948. The main points of its recommendations were:

***General*:**

(i) For rendering medical relief, the western and indigenous systems should be harmonized; and
(ii) Immediate steps be taken for the synthesis of Indian and western medicines in a practical manner, though it would be a difficult process and time-consuming.

***Education*:**

(i) Curricula should be drawn up in such a way that whatever is weak in one system should be supplemented by the strong points of the other;
(ii) Syllabus of integrated studies should be properly worked out, discarding out unnecessary details;
(iii) Curricula should be uniform for the whole country; and
(iv) Chairs of History of Indian Medicine should be established in modern medical colleges.

***Research*:**

(i) In the research institutes, experts of both the systems should work side by side checking and verifying the various hypotheses and theories of indigenous systems of medicine either rejecting or harmonizing them;
(ii) There is urgent necessity for research in Indian medicine to clear it of accretions of centuries of doubtful value and to make it intelligible to modern minds; and
(iii) A Central Research Institute should be established by the Government of India.

***Drug standardisation*:**

(i) Proper identification of medicinal plants, which are used in Indian medicines region-wise, should be made;

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(ii) Cultivation of all medicinal plants should be undertaken after a proper survey has been carried out; and
(iii) An Ayurvedic pharmacopoeia should be compiled.

The following were the positive decisions taken by the Government of India on the recommendations of the Chopra Committee:

(a) Facilities for research on scientific lines into the Ayurvedic and Unani systems of medicine should be promoted on a broad basis, as far as possible, on the lines recommended in para 251 of the Chopra Committee's Report. The results of such research, as are of proven value, will not only enrich the Ayurvedic and Unani Systems, but they will also be incorporated in modern medicine so that eventually there will emerge only one system of medicine. A start should be made by establishing one Centre of Research for this purpose;
(b) All-India legislation should be enacted for the registration of physicians, who have been practising Ayurveda, Unani and other systems of medicine for a specified number of years, and the practice of medicine by un-registered persons should thereafter be prohibited.
(c) However, the Chopra Committee's recommendation relating to the integration of different systems of medicine was not accepted by the Government of India.

Pandit Committee

Based on the recommendations of the Chopra Committee for the establishment of a Central Research Institute and the acceptance of this recommendation by the Government of India, a Committee was set up in 1952 under the chairmanship of the late Dr. C.G. Pandit to suggest a suitable place as well as the measures for establishing such an Institute. The recommendations of the Pandit Committee led to the establishment of the Central Institute for Research in Indigenous Systems of Medicine at Jamnagar in 1952.

Dave Committee

In pursuance of a resolution passed by the Central Council of Health in 1954, the Government of India appointed a Committee under the chairmanship of Shri D.T. Dave in 1955 to study and report on the question of establishing standards in respect of medical education, and regulation of the practice of indigenous systems of medicine. The Committee recommended the establishment of boards for the regulation of teaching as well as practice of indigenous systems of medicine, and submitted a model syllabus for an integrated course of 5½ years' duration. The report of the Committee was circulated to the state Governments, and their views placed before the Central Council of Health at its meeting held in Bangalore. The state authorities unfortunately did not view this report properly, with the result that the states were allowed either to accept it or leave it according to their discretion.

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Udupa Committee

In 1958, the Ministry of Health of the Government of India, constituted another Committee under the Chairmanship of K.N. Udupa, to assess and evaluate the existing facilities for training and research in Ayurveda, as well as the standards of the available Ayurvedic pharmaceutical products, and also to find out the factual position in regard to the practice and recognition of the Ayurvedic system of medicine. The important recommendations of this Committee were:

(i) In the interest of the resuscitation of the science of Ayurveda, an integration of the old and new medical practices would be essential, and as much of modern medical subjects as would be necessary to explain the gaps left in Ayurveda should be taught in Ayurvedic institutions;

(ii) The *Śuddh* (pure) Ayurvedic type of training should also continue, at least for some time to come, subject to the condition that ample provision is made in the institutions concerned for practical training;

(iii) A Central Council of Indian Medicine should be set up as the very first measure of reform;

(iv) Preparation of medicine and practice should be separated if the Ayurvedic practitioners' status is to be improved. Special courses like B.Pharm (Ayurveda) should be instituted;

(v) As a first step for the improvement of research in Ayurveda, a Central Council of Ayurvedic Research be established;

(vi) In the first instance, research work in Ayurveda should be done under the following seven heads: (a) Clinical; (b) Literary; (c) Chemical; (d) Botanical; (e) Pharmacognostical; (f) Pharmacological; and (g) Basic principles of Ayurveda,

(vii) Standardization of raw materials, minerals and other organic materials for the preparation of Ayurvedic medicine should be undertaken by the Central Council of Ayurvedic Research;

(viii) Standardization of the process of manufacture is urgently needed. For this purpose, the compilation of a standard Ayurvedic Pharmacopoiea should be taken up immediately. A uniform formulary for each standard medicine should be laid down;

(ix) There should be a Central Laboratory on the analogy of the Central Drugs Laboratory, Calcutta, for testing Ayurvedic drugs and medicines;

(x) A Drugs Act for Ayurvedic medicine on the analogy of the Drugs Act, 1940, should be enacted;

(xi) The Ayurvedic degree-holders should be placed in-charge of Primary Health Centres under the Community Development Programme; and

(xii) Ayurvedic practitioners should be given the same privileges as those of modern medical practitioners in the matter of issuing certificates of all types. The pay-scale of Ayurvedic practitioners in government or semi-government service should be the same as those applicable to modern medical practitioners.

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Important achievements after Independence

On the recommendations of the above Committees and the continued demand by professional organisations and public leaders, the Government of India established several institutions, standing committees and councils for the promotion of Indian systems of medicine. Some of the important steps taken in this regard are listed below:

(i) Establishment of the Central Institute for Research in Indigenous Systems of Medicine at Jamnagar, in 1952;
(ii) Creation of Post-graduate Training Centre in Ayurveda at Jamnagar, in 1956;
(iii) Starting a section of Indian System of Medicine, and the creation of regular post of Adviser (ISM) in the Department of Health, in 1958;
(iv) Establishment of Post-Graduate Institute for Teaching and Research in Ayurveda at Benaras Hindu University, Varanasi, in 1963;
(v) Amendment of the Drugs & Cosmetics Act for Control on Drugs of Indian Medicine, in 1964;
(vi) Creation of Central Council for Research in Indian Medicine and Homeopathy, in 1964 ;
(vii) Establishment of Pharmacopoeia Laboratory for Indian Medicine at Ghaziabad, in 1970;
(viii) Constitution of Central Council of Indian Medicine, in 1971, under the Indian Medicine Central Council Act, 1970;
(ix) Upgrading various departments of colleges of Indian medicine for post-graduate training from 1971 onwards;
(x) Establishment of National Institute of Ayurveda at Jaipur, in 1976;
(xi) Bifurcation of the Central Council of Research in Indian Medicine and Homeopathy: (a) Central Council for Research in Ayurveda and Siddha; (b) Central Council for Research in Unani Medicine; (c) Central Council for Research in Homeopathy; and (d) Central Council for Research in Yoga and Naturopathy;
(xii) Opening an Ayurvedic Hospital and several dispensaries and Units under Central Government Health Scheme;
(xiii) Establishment of Gujarat Ayurvedic University at Jamnagar, in 1967;
(xiv) Creation of Rashtriya Ayurvedic Vidyapeeth at Delhi, in 1988;
(xv) Establishment of Indian Medicine Pharmaceutical Corporation at Mohan, U.P., in 1984;
(xvi) Recognition of Ayurveda by the Parliament of Mauritius, in 1989; and
(xvii) Creation of a separate Department of Indian Systems of Medicine and Homeopathy in the Ministry of Health & Family Welfare, Government of India, in 1995.

Present status of Ayurveda, Unani and Siddha systems

Ayurveda, Yoga, Nature Cure, and probably the Siddha originated in India. The existence of Unani in India for about one thousand years with its overall development in the

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country provided a status to this system also as one of the Indian systems. In spite of the fact that the indigenous systems of medicine were neglected in the country during the British rule, these systems have remained popular specially in rural and remote areas.

As a result of the Government of India's abiding interest in these systems after Independence and the sustained efforts towards their standardization and related aspects, financial allocations were made in the successive Five Year Plans with increased outlay. It may be noted that the Government of India has adopted a National Health Policy for an effective medical care of our people.

National health policy

This policy has laid adequate emphasis not only on the promotion of the Indian systems of medicine but also the proper utilization of the large stock of medical manpower, including private practitioners available in these systems of medicine. The policy has also stressed the need to initiate organized measures to enable each system of medicine and health-care to develop in accordance with its genius.

Besides, according to this policy, planned efforts should be made to streamline the functioning of the indigenous medical services at the appropriate level in the overall Health Care Delivery System, specially with regard to the preventive, promotive and public health objectives. The policy has further laid down that steps be taken to move towards a meaningful and phased integration of the indigenous and modern systems.

***Administrative set-up at Central level*:** There is now a separate Department of Indian Systems of Medicine and Homeopathy in the Central Ministry of Health and Family Welfare. This Department is headed by a full-time Secretary with posts of Joint Secretary, Adviser, Director, and other staff under him. There is also a provision for a separate Minister of State for Indian Systems of Medicine & Homeopathy in the Ministry. The four Research Councils, as mentioned already, are functioning as apex bodies.

Besides, there are two separate statutory councils for regulating the education and practice of these systems, namely, the Central Council of Indian Medicine, and the Central Council for Homeopathy, in addition to some separate pharmacopoeia laboratories of Indian Systems of Medicine and Homeopathy and, subordinate offices functioning at Ghazibad in U.P., along with Pharmacopoeia Committees for each of these systems.

***Administrative set-up at the State level*:** The Departments of Health and Family Welfare of various State Governments and the Union Territories are looking after the developmental work of these systems in the respective states, viz. (i) Andhra Pradesh; (ii) Bihar; (iii) Gujarat; (iv) Haryana; (v) Himachal Pradesh; (vi) Jammu & Kashmir; (vii) Karnataka; (viii) Kerala; (ix) Madhya Pradesh; (x) Maharashtra; (xi) Orissa; (xii) Punjab; (xiii) Rajasthan; (xiv) Tamil Nadu; (xv) Uttar Pradesh; (xvi) West Bengal, and (xvii) Delhi.

All these states have also established Directorates of Indian Systems of Medicine, headed by a Director for their developmental activities.

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The Financial allocation made in the Five-Year Plans for the promotion of Ayurveda, Unani, Siddha, Homeopathy, Yoga and Naturopathy is given below:

Plan	*Financial allocation (in crores)*	
First Plan	0.40	
Second Plan	4.00	
Third Plan	9.80	
Fourth Plan	15.83	
Fifth Plan	25.07	
Sixth Plan	85.39	(Rs.29.00 crores for central sector, and Rs.56.39 crores for state sector)
Seventh Plan	129.05	(Rs.43.25 crores for Central sector, and Rs.85.80 for state sector)
Eighth Plan	382.00	(Rs.108.00 crores for central sector, and Rs.264.00 crores for state sector)

Health Care

There are, at present, more than 4,00,000 registered practitioners of Indian systems of medicine all over the country, particularly in rural and remote areas. There is also a network of colleges, hospitals, dispensaries, etc., as noted below:-

Number of Registered	*Ayurveda*	*Unani*	*Siddha*	*Total*
Practitioners	3,61,308	38,346	12,301	4,11,955
Dispensaries	13,183	310	947	14,400
Hospitals	2,054	170	108	2,332
Graduate Training Colleges	130	27	2	159
Institutes/Colleges for Post-Graduate Training	25	4	1	30

Under the Indian Medicine Central Council Act of 1970, it has been possible to prescribe uniform curricula and syllabi for graduate and post-graduate education, which are being followed by all colleges and institutions of Ayurveda, Unani and Siddha. The graduates coming out of these colleges are awarded degrees of B.A.M.S., B.U.M.S. and B.S.M.S., for the respective systems, and the post-graduate degrees are M.D. (Ay.), M.D. (Unani) and M.D. (Siddha), respectively.

Another achievement in this field is the affiliation of all the Ayurvedic, Unani and Siddha colleges with the Universities concerned. The Central Council of Indian Medicine is recognizing only such colleges of these systems as are affiliated to any statutory University.

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Gujarat Ayurveda University, Jamnagar

The Government of India established, as stated before, the Central Institute for Research in Indigenous Systems of medicine at Jamnagar, in 1952. In 1956, the first Post-Graduate Training Centre in Ayurveda was also set-up at Jamnagar. In 1963, both these organizations along with the Gulabkunwarba Ayurvedic Society were merged into one institution, which was named the Institute for Post-graduate Studies and Research in Ayurveda. The Government of Gujarat also established the Gujarat Ayurveda University under the State Act, in 1967, and the above institute was made an integral part of this University. So far, this is the only University of Ayurveda in the country, to which are affiliated 11 colleges of Ayurveda in the Gujarat State. The University is also imparting Post- graduate education in six subjects of Ayurveda, and conducting research in various aspects through its Institute for Post-graduate Teaching and Research in Ayurveda. The University has also developed a garden of medicinal plants-garden in a 30-acre plot of land near Jamnagar, besides a Library and Museum. The pharmacy of the University has been preparing standard Ayurvedic medicines for its internal consumption, and also engaged in drug standardization.

Ayurvedic Faculty of Benaras Hindu University

There are six post-Graduate departments of Ayurveda under the Institute of Medical Sciences, Benaras Hindu University, Varanasi. Research in Ayurveda on modern scientific lines is also being conducted in these departments. There is a separate faculty of Ayurveda, headed by a Dean under this University.

National Institute of Ayurveda, Jaipur

The National Institute of Ayurveda at Jaipur was established in February, 1976, at Jaipur, with a view to evolving and demonstrating high standards of training, teaching and research. The Institute runs two Ayurvedic hospitals along with a separate maternity and child welfare Centre, which has 250 beds.

Graduate and post-graduate training of high standard is also being imparted in this institute. 60 students are admitted every year for graduate training, and 45 graduates are admitted for post- graduate courses in nine subjects.

The Institute has also established a pharmacy for preparing all the medicines required for its internal consumption in C.P.D. and I.F.D.

National Institute of Unani Medicine, Bangalore

About a decade ago, steps were taken for the establishment of a National Institute of Unani Medicine by the Government of India in collaboration with the Government of Karnataka. Post-graduate education and research are the basic objective of this institute.

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About 50 acres of land on the outskirts of Bangalore city has been developed for the purpose, and construction work has been in progress.

Government College of Siddha Medicine, Palayamkottai

After the conversion of the Government College of Integrated Medicine at Madras into a Medical college, the College of Indian Medicine was shifted to Palayamkottai in Triunelvelli District of Tamil Nadu. Four departments of this college have been upgraded for post-graduate training in Siddha medicine. 75 students are admitted every year for graduate training in Siddha medicine at this College.

Another college of Siddha medicine was started at Palaṇi, which is now shifted to Chennai (Madras). A National Institute for Siddha Medicine is also proposed to be established in Chennai.

Rashtriya Ayurveda Vidyapeeth, New Delhi

The Government of India has started the Rashtriya Ayurveda Vidyapeeth, with a view to undertaking new experimentation in teaching in Ayurveda through the tradition of through *guru-śIṣya paraṃparā*. Under this programme, eminent scholars of Ayurveda are selected as *gurus,* and some research scholars of Ayurveda are associated with them as their disciples for two years' intensive training in all aspects of the subject concerned. Fellowships of Vidyapeeth are also awarded every year to Ayurvedic scholars, who have done outstanding work in the field of Ayurveda.

Research

The four separate Research Councils are engaged in clinical research, drug research, drug standardization, dietary research, survey of medicinal plants, and related areas . Some of their achievements are briefly given below:

***Clinical Research*:** Clinical assessment of the therapeutic effects of various herbs as single drugs, simple formulations, as well as compound formulations, has been taken up for intensive scientific studies. On the fundamental aspects, Ayurvedic concepts of diet, *prakṛti, agni,* health and diseases are also being studied. In addition, steps have been taken to study the community-based drugs *vis-a-vis* the impact of environmental factors on the incidence of disease.

***Therapeutic investigations*:** These have been planned at OPD and IPD levels to assess the efficacy of selected drugs, dietary regimen, and effective therapeutic procedures, as recommended in Ayurveda, such as *pañcakarma* and *kṣāra sūtra.*

Among the several single herbs, which have been found effective in the treatment of varied diseased conditions, the role of *guggulu* (*Commiphora mukul*) in the treatment of

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medoroga (obesity-lipid disorders), *hṛdroga* (cardiac disorders; ischaemic heart diseases), and *pakṣaghāta* (hemiplegia) have revealed important clinical landmarks in recent years. The beneficial effects of herbs like *maṇḍūkaparṇi* (Centalla asiatica) (in mental retardation), *karavīra* (Nerium indicum) (in cardiac disorders or cardiac arrhyemias), *śiriśa* (in bronchial asthma), *śatāvarī* (in the treatment of hyperacidity), and *pariṇāmaśūla* (peptic ulcer), including its *stanyaja* (galactogogue), have been scientifically proved, and they are among the important achievements. In addition, the, single herbs which are found to be medically efficacious are: *Aśvagandha* (Withania Somnifera) in *sandhiroga* (arthritis); *kaṇṭakāri* (*Solanum indicum*) in *śvāsa roga* (bronchial asthma); *yaṣṭimadhu* (Glycyrrhiza glabra) in *pariṇamaśūla* (peptic ulcer); *prasarṇi* (Sida veronicaefolia) in *gṛdhrāsi* (sciatica); *varuṇa* (Crataeva nurvala) in *śūla* (colic pain); and *mūtra asmari* (urolitheasis), *simbi (Dolichos lavlav)* , *saptarangi* (Salacia chinensis), *bilva patra* (Aegle marmelos) and *mamajjaka*(Emicos temma littorale), etc., in the cure of *madhumeha* (diabetes mellitus); *śākhotaka* (Streblus asper) in the treatment of *ślipada* (filariasis); *bhallātaka* (Semecarpus anacardium) in the treatment of *āmavāta* (rheumatoid arthritis and *vātavyādhi* or neuromuscular disorders); and *kaṭuki* (Picrorshiza kurroa) in the treatment of *kāmāla* (infective hepatitis).

Many simple but standardized combinations of drugs have been taken up for clinical trials pertaining to several ailments, and efforts are also being made to develop certain new single herbal combinations with the help of selected plant extracts.

Drug Research

The drug research programmes of the Council have been directed towards the identification and location of proper drugs and their standardization in order to provide genuine and standard medicine to the patients. The development of drugs from plant resources, which would protect liver, have also been taken up through chemical, pharmacological and toxicological studies.

Medico-Botanical Survey

Drugs being the primary need of the entire research programme, it is of paramount importance as the first step to conduct a systematic survey of medicinal plants, and locate the zones where particular and efficacious medicinal plants are available, which includes their botanical identification, collection and supply. Several teams at various institutes/ centres/units, under the Research Councils, have conducted qualitative as well as quantitative surveys of different forest areas to unearth hidden treasures of ethno-medico-botanical wealth of the country. About 300 forest areas in different states have been surveyed already. The Council has about 1,00,000 herbarium specimens in different regional herbaria, and about 1,500 authentic drug samples belonging to vegetable, animal and mineral kingdoms in the various regional museums of the Council. In addition, survey teams of the Council collect drug samples and supply them to appropriate

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institutes/centres/units engaged in carrying out different research studies. A beginning has been made in the direction of establishing a Central Herbarium and Museum at the Central Research Institute for Ayurveda, New Delhi. There is also a collection of about 3,500 herbal specimens of folklore claims. Experimental cultivation of certain important medicinal plants like *guggulu* and *mulethi* have also been undertaken at some of the centres. The extraction of musk, without killing the musk deer, is also being experimented, and a Musk Deer Farm has been established under the Council at Maharuri in the high altitude of Almora District.

Apart from the botanical field work,, literary research, health care, including tribal health care programme, pharmacognostical, chemical, pharmacological and toxicological research, drug standardization, and family welfare research programmes are also being conducted at various centres.

Achievements

The following are among the important achievements of the Central Council of Indian Medicine and its regional establishments.

(i) The Council has at present 16 patents for the processes or preparations formalized from the research programmes. Out of them, AYUSH-64 (anti-malarial), AYUSH-56 (anti-epileptic), and an anti-cancer drug have been released for commercial entrepreneurs for marketing;

(ii) Standardization of *kṣārasūtra* technique for the treatment of fistula, and *pañcakarma cikitsā* in disorders like *pakṣaghāta khañja* and *paṅgu* (monoplegia and paraplegia), *ardita* (facial paralysis) and *śaiśavīyavāta* (poliomyelitis);

(iii) Qualitative and quantitative surveys of different forest areas have been conducted to unearth the hidden treasure of medico-ethno-botanical wealth;

(iv) Successful cultivation of saffron in Ranikhet, a non-habitated area, and the cultivatation of *guggu*lu at Mangalia (near Ajmer);

(v) Determining preliminary standards for about 460 Ayurvedic formulations of different kinds, besides detailed standardization of 25 preparations; and

(vi) Successful breeding of musk deer in captivity and the maintenance at present of eight male and ten female deer of different age-group.

The Central Council for Research in Unani Medicine has been conducting research in the following areas:

(i) ***Clinical research***: Six Unani formulae have been clinically evaluated on patients of vitiligo. Results of positive nature ranged from 62 to 89%. More than 18;000 cases of vitiligo have been treated at the Central Research Institute for Unani Medicine, Hyderabad. Significant results achieved in the treatment of some other diseases include the cure of infective hepatitis (80-85% response) and malaria (70-80% response). 19 other diseases are under study, and 46 Unani formulae are being clinically evaluated in respect of these diseases. Certain

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diseases like vitiligo, bronchial asthma, liver disorders, diabetes mellitus, etc., for which modern medicine does not have lasting remedies, are being clinically studied for their efficacy under the Unani System.

(ii) ***Drug research***: Under the Drug Research Programme, 50 single and 208 combined Unani drugs have been standardized, and the results have been published in the form of monographs.

(iii) ***Literary research***: The Council has published Urdu translations of important classical literary sources of Unani system from Arabic and Persian originals. Under the scheme of the Survey of Medicinal Plants, a large number of medicinal plants have been collected and preserved. Some important medicinal plants, which are still being largely imported, have been successfully domesticated and cultivated. (e.g., *atrilal* (Ammi magus), *Gulner Farsi* (Punica granatum), *Mulathi* (Glycyrrhiza glabra), and *Aftimoon vilayati* (Cuscuta chinensis).

Formularies and Pharmacopoeia

The Pharmacopoeia Committees for Ayurveda, Unani and Siddha systems have been engaged in the preparation of respective formularies and pharmecopoeia. The first volume of the Ayurvedic Formulary, consisting of 444 formulations, has been already published. The second volume, containing 190 formulations, has also been prepared, and is under print. The first volume of National formulary for Unani Medicine, comprising 440 formulations, has been already brought out, as also the first volume of Siddha formulary, consisting of 248 formulations (to be published). As for Pharmacopoeia, the first volume of Ayurvedic Pharmacopoeia, consisting of 80 monographs on single drugs of herbal origin, has been prepared and is under print. A Homeopathic Pharmacopoeia, encompassing 605 monographs in 5 volumes, has been already brought out.

Pharmacopoeial Laboratories

Two Pharmacopoeia Laboratories—one for Indian Medicine and the other for Homeopathy—have been set up at Ghaziabad, near Delhi, for working out standards and developing tests for single drugs as well as compound formulations. A small museum of medicinal plants has also been set up to facilitate the identification of drugs used in Indian systems of medicine.

Drug Control

In order to provide genuine indigenous drugs of good quality, Chapter IV-A, dealing exclusively with Indian Systems of Medicine, was inserted for the first time in the Drugs and Cosmetics Act of 1964, (operative from December 1969), to bring within its purview, to some extent, the Ayurvedic/ Unani/ Siddha drugs manufactured for sale. Under the provisions of this Chapter, a Drug Technical Advisory Board has been set up to advise the

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Government on technical matters relating to the quality control of drugs of the Indian systems.

Every State Government/Union Territory is required to appoint a licencing authority for this purpose, which shall issue/ renew a licence/loan licence for this manufacture (for sale) of Ayurvedic/Siddha/Unani drugs after a through examination of every application to determine whether it fulfils all the requirements under the Act, after consulting the approved experts in these systems of the state concerned. Such licence would be valid up to 31st December of each year, and the licencing authority is empowered to cancel such licences if they fail to comply with any of the conditions of licence. Further, from the date the State Government had notified the implementation of these provisions, it was prohibited to manufacture for sale the Ayurvedic/ Siddha/Unani drugs without a licence by the State licencing authority. All Ayurvedic/Siddha/Unani drugs are required to be labelled in the prescribed manner giving the list of ingredients, name of the manufacturer, batch no., lot no., date of manufacture, etc., and also the words "to be taken under medical supervision", if it contains substances specified in Schedule E-1. However, these rules are not applicable to Vaidyas/Hakims, who on their own prepare drugs for their patients as well as for drugs prepared in small quantities for research and analytical pruposes.

Under these provisions, the Government analysts and drug inspectors are appointed and notified by both the Centre and the states. An inspector is authorized and supposed to inspect twice a year the premises where the drugs are manufactured and give a detailed report to the licencing authority. He shall also send the samples to Government analyst, and can institute prosecution if there is any violation of the Act and the rules made thereunder.

The Government analyst shall analyze and test the samples of the drugs sent to him by the inspectors or by such other competent persons and furnish reports of his results. He shall also send the report of analytical work and research to Government for publication at the discretion of the Government.

The objective of bringing Ayurvedic/Siddha/Unani drugs under the purview of Drugs and Cosmetics Act is to ensure that genuine Ayurvedic/Siddha/Unani drugs of good quality are made available to the public. Under the provisions of the rules of this Act, all raw materials used in the preparation of Ayurvedic/Siddha/ Unani medicines are to be identified and tested, and records of such tests and methods should be maintained.

Drug Industry

There are over 7000 licenced pharmacies, which are producing drugs of Indian systems, and 588 licenced pharmacies pertaining to homeopathy, besides 374 holding loan licence. Many States have their pharmacies, herbal farms and drug-testing laboratories. The Government of India has established the Indian Medicine Pharmaceutical Corporation Limited (IMPCL) as a Public Sector Undertaking at Mohan (Uttar Pradesh). The main objectives of this enterprise are to make available good quality medicines of Indian systems for supplying them to Government institutions and research units, and also for sale in the open market.

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Medicinal Plants

With a view to ensuring an uninterrupted supply of raw materials (herbs) for the manufacture of drugs, the Health Ministry has taken steps to co-ordinate several activities among the various departments of State and Central Governments and other organizations to find out the quantities of raw materials required for the drug manufacturing industry and to make future projections for the next 10-15 years. A series of regional seminars/ workshops have been organized by the Health Ministry to study the various aspects of medicinal plants on regional basis. The plants which are required to be specially grown for each region have been identified, and those that are on the verge of extinction have also been identified, for their first cultivation and preservation of germ plasma. Greater involvement of State Forest Departments is also being ensured, as they presently provide 80 per cent of the raw material as minor forest produce. As a result of the recommendations at these seminars, a Standing Committee on Medicinal Plants has been set up under the Chairmanship of the Minister of State for Health and Family Welfare.

New Programmes

New priority programmes for Ayurveda, Unani and Siddha have been carefully worked out. Among them are: (i) strengthening standardized education in Ayurveda , Unani and Siddha; (ii) ensuring quality control of Ayurvedic drugs; (iii) setting up specialized centres of Ayurveda, Unani and Siddha; (iv) establishing more Post-gradate departments for these systems; (v) development and cultivation of medicinal plants; (vi) establishing hospitals at district and taluk levels ; (vii) involvement of the traditional systems in national health programmes; (viii) intensive research in these systems on modern scientific lines; and (ix) preparation and distribution of simple health formulations. It is hoped that with the commitment of the Central and State governments to the promotion of the Indian systems of medicine, they will continue to play a vital role in the medicare of the vast Indian populace.

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CHAPTER 16

The Spread of Ayurveda Outside India

Rangesh Paramesh

The great plains of South-East Europe and Asia, called the South Russian Steppe, which extends from the Caspian to Central Asia, has been regarded as the cradle of movements of the human races of the ancient world. The geographical features and inclemencies of this area being suited to nomadic tribes only, they always prompted the inhabitants to make further advances towards more fertile lands leading towards India, Iran, China, southern and central Europe, as well as towards the fertile region of Babylonia and further to the eastern and southern Mediterranean lands. The Oxus valley had been the central meeting area, since the ancient land routes from all sides converged into and diverged from there to the farther countries in all directions. Various immigrant hoards like the pre-Aryans, the Aryans, the Yuchis, the Śakas, the Scythians, the Samaritans, the Hunas, the Turks, the Mongols, and others traversed the land on their way to fertile Indian lands, and became a constituent part of the later Indian population. It was a complex process of interaction, amalgamation and assimilation with the existing population. These events of contact and interaction necessarily resulted in the exchange of thoughts, knowledge and materials with their affiliated or associated names. Historians and other scholars have rightly observed that the whole area from the greater India in the east to the greater India in the west, including Central Asia, formed one cultural land complex, where India, by virtue of its topography and natural features, emerged as the mid-recipient centre.

TRANSMISSION IN THE ANCIENT WORLD

It is generally held that the extension of Indian culture beyond its geographical frontiers is intimately connected with the spread of Buddhism, particularly due to the efforts of Ashoka and other rulers. But, recent researchers have shown that the dispersal of Indian culture, at least in Soviet Central Asia, can be traced back to the earliest times, *i.e.* to the early Stone Age. Thus, it takes us back to about half a million years. But, the diffusion of India's cultural immensity over the vast expanses of Asia and other regions is about six

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thousand years old. Since then, India had over-land trade relations with far-off countries like Egypt, Assyria and Babylon, and also by sea-route. There were also land-routes connecting China on one side and Europe and the Middle-East on the other, with Central Asia acting as common meeting region. Over the centuries, India maintained a fair contact with all these parts of the world, as it was connected with the grand land route of Central Asia on its crossroads.

INDIAN MEDICINE AND OTHER CIVILIZATIONS

India has been a country, which is noted for its highly developed civilization. Along with Egypt, China, Greece and Mesopotamia, India may be called the cradle of medicine. The ancient Indian Medicine, Ayurveda, has played a decisive role not only in the further development of medicine in India, but also in the neighboring countries, especially in Central Asia. The close economic and spiritual ties have, for a long time, existed among India, Iran, Afghanistan, and the other parts of Central Asia. It is common knowledge that the civilization of the ancient peoples of Central Asia and India has grown on the crossroads of the East and the West, in the centre of military, trade and cultural matrix of history. It is for this reason that the history of its scientific, philosophic and artistic thought is the history of the synthesis of different cultural traditions, the history of creative interaction and mutual spiritual enrichment of different peoples. Medicine was one of those spheres of scientific, philosophic and practical experience, from which one could trace the sources of this interaction.

Among the early civilizations in antiquity, only three—Greece, India and China—developed full systems of representation of physiology and pathology, although there were rich medical works in ancient Egypt and Mesopotamia. But, according to the numerous documents now recovered, an ancient Mesopotamian Medical Manual, possibly dating back to the Hammurabian period (c. 2000 B.C.), contains many medical concepts, which reappear in changed but unmistakable forms of Indian Ayurveda and the Hippocratic tracts on medicine. The supposed special symptoms of imminent death, as recorded in this work, are also found, though in a less archaic and empirical form, in practically all Ayurvedic texts. This general concordance between the ancient Mesopotamian system and the Indian and Greek ones is also strikingly observed in the case of symptoms of demonic possessions specially of children. Nevertheless, according to the numerous documents now recovered, the medicine in Egypt and Mesopotamia was chiefly practical, and the historians are not aware of a great development of rational attempts to understand the functions of the body and the course of diseases.

AYURVEDIC TRADITION

There is a view that Ayurveda is not a solitary medical system by itself, but shares with the other systems in respect of basic principles of medical knowledge and practices common to all methods of treatment in the other culture-areas. The recent discovery at

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Boghas Koii in Cappadocia, an ancient kingdom, which later became a Roman province and flourished in 300 B.C.-100 A.D., has revealed the names of Nāsatyas and other Vedic gods in Cuneiform character. The occurrence of the name Naunghaitya in the *Zend-Avesta* clearly directs one to search for the medical knowledge as taught by the celestial Asvins, not solely in India, but also in Persia and Mesopotamia.

The history of the creative enrichment of Indian and Central Asian art of healing experienced three stages. First (in time), it coincided with the epoch of Kushana kingdom and during the reign of Kushana Emperor, Kanishka. The *Caraka Saṃhitā*, one of the most famous classics dealing with medical sciences, was written in ancient India, and later translated into the official language of Samanid Iran (Pehlevi).

The second stage of interaction was linked with the period of Gundishapur (Iran) Academy and its activities. In its medical school, the historical traditions of Iranian, Indian, Greek and Central Asian medicines were inter-connected.

The ways of penetration and the merging of Indian, Iranian and Central Asian medical schools were of many kinds: the forced or free migrations of physicians from one country to another, honoured invitation of famous physicians in the case of illness of a Shah or his relatives, as well as of statesmen or well-to-do merchants and land-owners.

The third period of interaction of Indian and Central Asian medicine began after the Arabian conquest of Iran and Central Asia (700-800 A.D.), and the development of Arabian literature on medicine derived from Indian sources, specially during the Caliphate at Baghdad.

Ayurveda in Greece

Not a few concepts of Greek medicine are likely to have been Indian in origin. It is very likely that Indian medical ideas spread to Greek and Greco-Roman lands either by direct contacts or by indirect communications. About the year 416 B.C., the first Greek physician, Ctesias, a physician at the Persian court, came to India, and in the year 327 B.C., the yoke of Alexander the great, fell upon the frontier of that country. About the year 300 B.C., Megasthenes, officiated as the ambassador at the court of Sandracottus. This contact of Greeks with Indians continued unbroken throughout the reign of the Diadochi, and the Roman and Byzantine eras. Alexandria, Syria and Persia were the principal centres of intercourse; some names of Indian physicians, and the means and methods of healing, as well as many diseases endemic in India, but previously unknown, have been mentioned by Greco-Roman, and Byzantine authors.

Whether these or other later Greek physicians became acquainted with the medical views of the Indians or in anyway exercised upon them a permanent influence, is very doubtful; for, the Greeks themselves acquired only a scanty acquaintance with Indian views and could therefore impart probably none of their own to Indians.

According to Ctesias, Indian physicians were specially skilful in the treatment of the bites of serpents. Alexandria's army physician did not know any cure for snakebites and the other diseases endemic to the area. Indian doctors were called in, and some of them later accompanied the returning army back to Greece. Megasthenes declares that the

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Indian physicians lived a very simple life, used a few drugs, and made their wives as fruitful as can be imagined, while by the administration of certain medicines they could beget boys or girls with inconceivable certainty.

These were the glimpses of the spread of Ayurveda in the Hellenic Empire, though some fragments of Ayurvedic knowledge must have found their way earlier through Iran as well as maritime trade routes. It was evident by the fact that substances like pepper, cardamom, musk root plant, indigo and cane sugar, indigenous to India at that time, were among the earliest exports of India to Greek and Greco-Roman ports.

The clear articulation of the theory of an internal and vital organic breath (*Prāṇa* akin to the cosmic wind), as the agent of all motor activity of the living body and its involuntary muscles, as well as that of movements of fluids circulating inside the body is an important concept of the ancient works, *Agniveśa saṃhitā* and *Bhela saṃhitā*. A much less precise version of this thesis is found in the Hippocratic texts on Pneuma (Breaths), where bodily wind is simply stated to be the cause of the principal phenomenon which accompanies fevers, shivering, trembling, yawning, resolution of articulation, transpiration and the like. The Hippocratic tracts had their origin mainly between the fourth century B.C. and third century A.D., and do not antedate the *Bhela saṃhitā* and the *Agniveśa saṃhitā*. The treatment of this theme in the works of *Caraka* (the redaction of *Agniveśa saṃhitā* or *Tantra*) and *Suśruta* is much more elaborate and sophisticated showing a gradual local development. Many scholars trot out the theory of later interpolations or even past forgeries, while the fact is that Indian texts show higher development in any concept compared to later or contemporary Greek texts.

Arguments such as these, however, can cut both ways. Again, the typically Indian concept, found in many basic Indian philosophies of ancient origin, of the creation of the embryo at the moment of conception, by the simultaneous congress of the *Puruṣa* (self existent eternal soul) the vital breath, the parental semen and the maternal seed, is found in a somewhat changed form in the Hippocratic text on the nature of a child. In this respect, the latter work mentions that maternal seed is unique in Greek medicine, though this idea is very common in Ayurvedic texts. Another example is the similarity of a general theory explained in Plato's *Timaeus* with the famous *Tridoṣa* theory of classical Ayurveda. Such theories referred to by Plato, without any indication of origin, are isolated in the Greek tradition. Health rests upon the correct association between three elements (Air, Fire and Water) and Pneuma, which represents the wind, chole, the gall, which represents the fire and Phlegm, which is a form of water. These correspond to *Vāta*, *Pitta* and *Kapha*, the tridoṣas of Ayurvedic tradition, respectively. And these *doṣas*, specially their association with the three elements, were already known in Vedic literature. The tridoṣa theory can not have been borrowed by India from Plato. On the contrary, as during the Persian domination of the Greek and Asian countries, India's scientific exchanges would have been easy, and the influence of the Ayurvedic theories on those described by Plato is quite probable.

These and many other examples make it logical to suppose that these ideas, which developed progressively in Indian medical literature, were not Greek in origin. They were imported into Greece along with many other Ayurvedic concepts, some clearly discernible, others changed beyond possible recognition.

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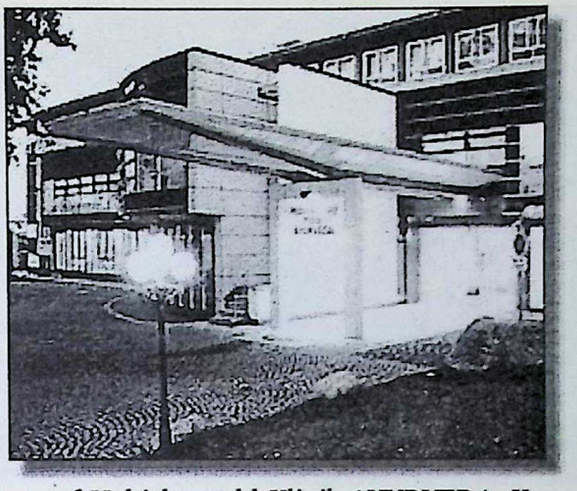
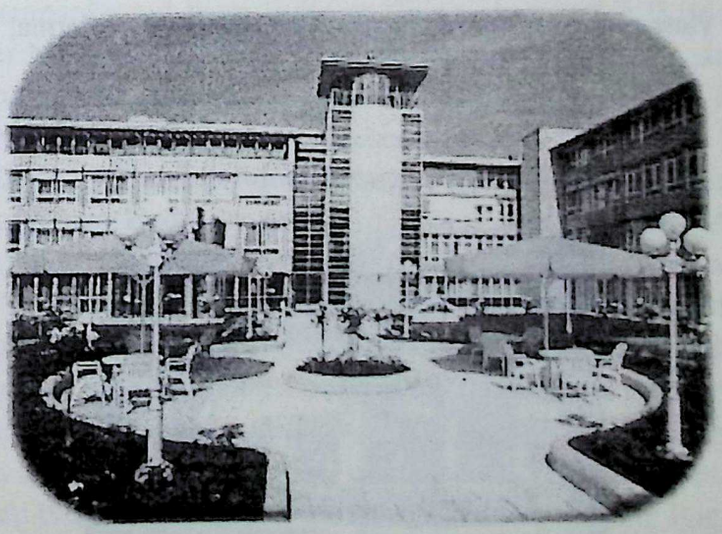


1. Entrance of Habichtswald Klinik-AYURVEDA, Kassel, Germany

2. Oil Massage (Abhyanga) is under progress in the Klinik.



3. Ayurvedic Hospital Enclave at Habichtswald Klinik-Ayurveda, Kassel, Germany.

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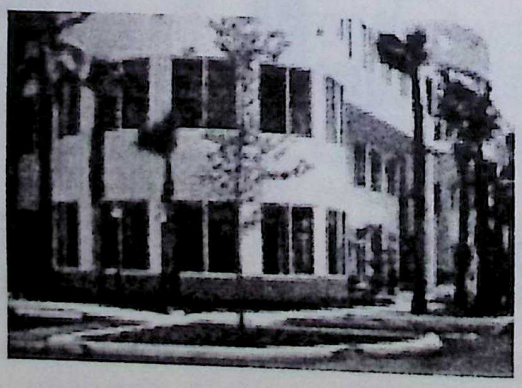
4. Collections of Haritaki (Terminalia chebula) fruits in a Herbal Exhibition in Japan.

5. View of a bookstore in Ayurvedic College in California, USA.



6. A view of the Florida Vedic College, Florida.

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Pythagoras (5th cent. B.C.), a pioneer of proto-medicine in Greece, is said to have acquired his knowledge from the Egyptians, but he would have learnt this art largely from India. It is said that there is much that is common in the medical teachings of Pythagoras and Ayurvedic medicine. The Greek physician, Galen, who practised in Rome, also adopted many principles of Ayurveda and included them in his works.

Megasthenes, the Greek ambassador to India in the court of King Chandragupta Maurya, tells us how the diseases of elephants are to be cured, and gives prescriptions, which are clearly borrowed from the *Hastyāyurveda* of Pālakāpya.

Besides these, the Indian elements in the materia medica of Dioscorides and earlier authors can be easily ascertained; for example, Pippali, Pippali mūla (fruits and roots of *Piper longum*), Kuṣṭa (*Saussurea lappa*), Śrngavera (*Zingiber officinale*), Elā (*Elettaria cardamomum*) etc. Still more are many examples and references of interaction between India and Greece. Though the debate on who borrowed is difficult to decide, there are several direct references in the Hippocratic collection to the borrowing of some Indian drugs and Indian medical formulae in Greece. According to Dr. Wise, whose researches first upset the theory of Greece being the originator of all in medical history (and if anything at all came before Greece it was some dim immemorial Egypt of which is little known) is of the opinion that Greece and Egypt alike who may both owe their scientific relations to India, have been the 'learners' and not the 'teachers'. As he puts it, "Asia can benevolently give, but it does not need to borrow, its ideas and fantasies are as exuberant as its vegetation".

Contact with China

In the period of the expansion of India towards Central Asia as well as China and toward Indo-China and Indonesia beyond the seas, there was transmission of Indian medicine along with astronomy, religion and arts.

Buddhism was transplanted from India to China about 67 A.D. It is authoritatively said that the Emperor Ming Ti (58-76 A.D.) of the Eastern Han had a dream in which he saw a high shining image of a god, which appeared to him and entered his palace. As per the courtier's interpretation of the dream, he sent 18 men to India to ask for Buddhist books and teachers. These 18 ambassadors brought back to China images of the Buddha, Buddhist scriptures and two Buddhist monks, Kaśyapa and Mātaṅga. As a result of the frequent pilgrimages made by enthusiastic Chinese Buddhists to India and the arrival of many Indian monks in China, the art, science, and other phases of Indian culture were brought over to China, which in course of time exerted a profound influence on the life and thought of the people. Hitherto, the Chinese healing art was entirely indigenous, but then a change was felt. The etiology and pathology of disease were affected by Buddhist ideas. The body was submerged, while the mind was emphasized. It has been stated: 'Humanity suffers from two kinds of afflictions: physical and mental. For physical ailments the drugs of Pien Chicao will be effective, but for mental afflictions nothing but Buddhist remedies are required'. It may be said that faith healing, hypnotism, autosuggestion and other psychotherapeutic measures mostly originated from Buddhism. And, out of this

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arose the art of meditation, a system of graded exercise, which aims at developing the mind to a state of mental repose or relaxation. Thus, medicine in China, in addition to its indigenous development, was strongly influenced by Buddhist monks from India, who apart from their religious training, were also trained as physicians practising Ayurveda.

The recovery from the sands of Central Asia Comprised not only some sacred Buddhist texts and documents of archives in Sanskrit, or Prakrit, but also medical manuscripts in Sanskrit, which were translated from Sanskrit into regional language, like Kuchean or Khotanese. The manuscript of the *Yogaśataka,* ascribed to Nāgārjuna or Vararuci, is a summary of the *Aṣṭāṅga* of Ayurveda, and thus exactly corresponds to a text which was described as famous in the 7th century by the Chinese pilgrim Yi Tsing. It was later translated into Tibetan, and was still in use in Sri Lanka at the end of the last century.

In the Eastern World

In China, Korea and Japan, the influence of Indian medicine was not important like the influence of Buddhism because other medical traditions were there already established long before the beginnings of the Buddhist propagation. Nevertheless, Indian drugs were accepted, if not the doctrines. A number of drugs together with their Indian names have been preserved in the famous Japanese Imperial Treasury, the *Shoso In*, since the VIII century. In Cambodia (Kambuja), where the name of Suśruta occurs in the Sanskrit epigraphy (890 A.D.), several inscriptions give lists of drugs in Sanskrit and diet prescribed in hospitals under the King Jayavarman VII (1181-1281 A.D), who established 102 hospitals (*Arogyaśālās*).

But it was in Tibet that Indian medicine achieved its greatest popularity. It was fully adopted there in the 8th century, and a big work in four parts (*Catustantra*, in Tibetan, *Rgyud bzhi*), entitled *Amṛtahṛdaya* is said to have been translated from Sanskrit to Tibetan. The teaching embodied in this text is ascribed to Buddha Bhaiṣajya guru. The original Sanskrit is unknown, and some scholars have supposed that it never existed. But a number of passages are clearly literal translations of the quotations from the *Saṃhitās* of *Caraka* or *Suśruta*. So, if the compilation of the work has been done in Sanskrit before the translation into Tibetan or, if it has been done by the Tibetan translators themselves, in both cases it is a faithful translation from the original Ayurvedic tradition.

This work has been commented again in Tibet, and translated from Tibetan into Mongolian. From Mongolia, it was brought to Russia at the end of the last century, and there also it was popular. The Mongolian version together with a Russian translation has been partly published by Pozdnevev.

Several other Ayurvedic treatises have been translated into Tibetan, and are included under the Tibetan *Tanjur*. The first one is the *Yogaśataka* already referred to. The most extensive is the *Aṣṭāṅgahṛidaya* of *Vāgbhaṭa*, together with two compendious commentaries. Traces of Buddhistic ideas are found in *Vāgbhaṭa*, and this explains its transplantation into Tibet.

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From Tibetan, these works have also been translated into Mongolian language as parts of the *Tanjur*. Besides, the whole-hearted reception of the Indian medicine in Tibet leads us to conclude the existence of Buddhist medicine in India.

The detailed statements of the Buddhist Chinese traveller I'Tsing (671-695 A.D.) on the conditions prevailing at that time of Indian medicine (medicinal herbs, the Tridoṣa, diagnosis, fasts, etc.) agree to the contents of *Caraka* and *Suśruta*. The Chinese traveller even quotes from a *sūtra* on medicine preached by the Buddha himself.

The Buddhism had brought medicine to Sri Lanka (formerly Ceylon) still earlier than Tibet. However, apart from the *Saraṭṭhasaṅgraha*, known only from the continuation of the *Mahāvamśo*, the *Yogārṇava* (1300 A.D.), appears to be the oldest medical work. The Buddhist king Buddhadāsa of Ceylon (400 A.D.) cured the ills, maintained physicians to whom he extended special grant, erected asylums and wrote *Saraṭṭhasaṅgraha.*

Although the fame of *Suśruta* had spread about 900 A.D. from western India to Kamboja (Cambodia), *Suśruta saṃhitā*, *Dravyaguṇa*, and other medical works, were directly translated from Sanskrit into Burmese only in the 18th century. The technical terms in Burmese medicine are also derived from Sanskrit.

In Persia

From the Aryan antiquity originated particularly the oldest Indo-Persian terms for physician and medicine (*Bhiṣak* - Bizisk, *Bheṣajam* - Baesazem), for magic spells (*mantra* - mathra), some names of diseases, and the most common names of certain parts of human body. The Persian medicinal substance, *Pārasīkayavāni*, is mentioned in Siddha Yoga (100 A.D.). Earlier, *hiṇgu* (asafoetida) occurring in Suśruta and other works as well as the orange (*nāraṅga*) must have been imported from Persia. In the middle ages, calcination, extensive therapeutic usage of metal and mercury, opium as well as pulse examination reached India from Persia or Arabia.

On the other hand, Indian works on medicine were translated into Persian already during the time of Abbasians or perhaps of the Sassanians. These are not available at present. Then followed the Arabic translations of Persian works. Except *Caraka* and *Suśruta*, the names of the translated Indian authors are difficult to identify. Yet, the Arabic accounts of the contents of these works and quotations therefrom in the medical treatises of *al-Razi* and other Arabic writers reveal that they dealt purely with Indian products. Much Indian material is found in the preserved Persian work of Abu Mansur Muwaffaq on pharmacology (1000 A.D.). The author himself had made a scientific journey in India and borrowed from Indian works. Before this, in 850 A.D., the Persian physician, Ali Ibn Rabban at Tabari, wrote a treatise, the *Firdaus-ul-hikmat*, in which is included detailed information about Indian medicine.

The influence of the Ayurveda in Iran, even before its conquest by the Arabs, has been clearly established. The Iranian King, I Chosroes I (531-579 A.D.), had a physician named Burzuya, who had brought a version of the *Pañcatantra*, the Indian book of Fables into Iran after his journey to India. The autobiography of this physician contains a summary of embryology, which has been recognized by Hertel as containing typical

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Indian notions. Burzuya, for example, says that delivery is caused by a wind, and this is 'precisely the teaching of classical Indian medicine'. It is, of course, not likely that this Indian idea was not introduced by Burzuya, but had reached Iran even before this time, for there is positive evidence of the Indian influence on the famous medical school established in the 500 A.D. at Gundeshapur in Susiana by the Nestorians, who were expelled from the Byzantine Empire. It is interesting to note in this connection that in the chapter dealing with the functions of the 'wind' in the extant text of *Caraka saṃhitā*, mention is made of the presence of *Kānkāyana*, the physician from *Bāhlīka*, in an assembly of learned men gathered around master Ātreya and *Bāhlīka* or Bactria on the other side of the Hindu Kush mountains, that was included in the dominions of Chosroes I. Apart from the writings of Burzuya, this Indian legend is a reminiscence of the close contact between Iranian and Indian doctors.

Arabic World and Ayurveda

The spread of Ayurveda in Arabic countries is well authenticated, and not based in inferences. Owing to the meticulous habit of Arabian scholars of keeping complete records of historical and cultural events, it has been possible to get a clear picture of the prestige and popularity of Indian medicine in this area from earliest times. The considerable amount of surviving literature in Arabic and Persian on medicine contains many translations from Indian treatises, as also much material was indirectly utilized from them. The medical scholars of the two lands, who travelled frequently from one country to the other before and after the Islamic conquest of India, have contributed much to the mutual enrichment of knowledge. The science that the Arabs carried with them in their far-flung Empire must have contained a fair amount of Indian contribution, especially in medicine, just as they brought much of Greek science to their Indian Empire.

The interaction between India and Central Asia assumed a new dimension after the Arabian conquest of Iran (700-800 A.D.), and the displacement of scientific centre from Gundishapur to Baghdad. Arabic savants worked hard for translating Indian, Greek and ancient Persian medical works into Arabic with the help of experienced scholars of Gundishapur. With the extension of Arabic as the language of science through Iran, Afghanistan and Central Asia, those books and treatises, which incorporated the achievements of Indian medicine, began to spread as well. Messengers were sent from Khorasan to India not only to bring herbs, but also to collect information on Ayurveda.

The Arabs had established trading centres in the Malabar Coast of South India in the seventh century, and used to carry away spices, dyes, drugs and scent materials to their other centres in Asia, Asia Minor, Africa and Europe. This made the world of Arab trade-conscious of the quality of Indian drugs. In the eighth century, the Arabs conquered the Indian province of Sind. The cultural genius of Abbasid rulers, who were curious about the long reputation of Indian science, specially medicine, lost no time in sending scholars to India, and also invite Indian scholars to visit them. Thus began a veritable exchange of scientific ideas, by direct contact, between the two countries, in philosophy, mathematics and medicine. The Abbasid Caliph, Harun al Rashid, was famous for his patronage of

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learning and science. He actively encouraged the learning of Ayurveda, and prompted some of the classical treatises of India to be translated to Arabic. An emigrant Indian medical scholar became the physician-in-chief of the state dispensary after he was successful in curing his royal patient of a long-standing stomach trouble. This Indian scholar translated the *Suśruta Saṃhitā* into Arabic under the title of "*Kitāb-Samural-hind-i*" of 'Susrud'. The famous scholar Al Ibn Zaim translated the *Caraka Saṃhitā* into Arabic as the treatise of 'Sarag'. In later years, the *Nidāna* of *Mādhava* was translated under the title "Badon", and the *Aṣṭāṅgahṛdaya* of Vāgbhaṭa as "*Aṣṭaṅkar*". The Ayurveda thus became a well-known science in Arabia, whence it spread to Turkey, Egypt, Persia and the Mediterranean countries, which were under Arab domination in later ages.

A well-known scientist-encyclopedist-naturalist Abu Raihan Biruni (973-1048) in his book *Kitāb-al-saidana-phit-ṭib* (on Pharmacology) gave detailed description of 4500 names of plants, animals and mineral drugs. Indian names accounted for 350 (7.8 per cent) of them.

Amongst the scientists, who came from Khorasan, Abu-Mansur Muvaffak Ali Khiravi gave a detailed description of Indian medicine, especially of Indian drugs. In his book *Kitāb-ul-abniya 'an-Haqa' iq-il-Adviya* (The Book of main properties of Drugs), written in Dari (967 A.D.), Khiravi stuck to the principles of Indian medicine, while classifying the drugs, like (i) provisions, (ii) medical food, (iii) medical substances, and (iv) poisons. He emphasized the advantages of Indian medicine and drugs as follows: 'Indians have many drugs, which are more active, and their possibility to advance science is greater. Many drugs could not be seen in other parts of the world, but in India'.

In the late tenth and early eleventh centuries, first medical books appeared written in Farsi-Dari or Tajik, where the principles of Ayurveda were clearly depicted. Among them there are such books as *Kitāb-Hidayat al - Mutallimin fiz-Tib* (The Guidance of Learning Medicine), written in 961-981 A.D., by Abubakar Rabi Ibn Ahmad Ahavaini al-Bukhari, and *Donishnamoi Maisari* (The Book of knowledge of Maisara), which was written in the form of poetry by Khorasan Maisara Hakim.

Quite a new phase in the history of interaction of Central Asian and Indian medical traditions is associated with the name of Ibn Sina, popularly known as Avicenna. His *Canon of Medicine* is, on the one hand, a voluminous synthesis of the achievements of medical science and practice of many centuries and nations along with those of Indian people and, on the other hand, it has played an important role in the development of medicine in the East and West. In his second and fifth books of the Canon, the author describes almost 30 Indian drugs. Several times, he quotes the name of Caraka, the Indian Physician.

In the chapter entitled 'About Diet', Ibn Sina has referred to the Indian medicinal practices. In general, one can clearly see in the Canon the traces of conventional Indian medicine for the most part.

ANCIENT INDIAN UNIVERSITIES AND FOREIGN VISITORS

The study and practice of medicine were encouraged in ancient India. In those days, one could become a physician by following one of the following courses: (i) he could learn the

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theory and practice of medicine as an apprentice to a teacher by living and working with him in his house; (ii) he could join a *gurukula*, a residential school situated in the forests, away from human habitation; and (iii) he could join one of the institutes of higher learning at Taxila, Kāśi or Nalanda. Foreigners, who came to India for higher education, have given accounts of some centres of medical education existing in the country.

Takṣaśila

Takṣaśila, situated at about 20 miles west of Rawalpindi, (now in Pakistan), is the most important seat of learning as early as the sixth century B.C. It attracted students from all corners of India, from Rajagriha, Mithila, Kashi, Ujjaini, Kuru, Koshala etc. Its fame had spread far and wide in foreign countries, too, as some foreign students were on its rolls. There are many glorious accounts of Takṣaśila in the writings of foreign visitors. Pliny called it a famous city; Strabo declared it to be a large city; Marrian described it as a large and wealthy city, and the most populous between the Indus and the Hydaspes (Jhelum). Vincent Smith in his history says: 'It was the leading seat of Hindu learning, where crowds of people from all quarters were taught Vedas and other subjects. It was a fashion to send princes and sons of the well-to-do on attaining the age of sixteen to complete education Takṣaśila, which may be properly be called a University town. The Ayurveda medical school there enjoyed a special reputation, but all forms of arts and science could be studied under the most eminent professors'. Some of the most learned men in ancient India had either graduated from Takṣaśila or were associated with it. They included Ātreya, Cāṇakya, Pāṇini, Jīvaka, Vyādi, Kumāralabdha, Aśvaghoṣa, Nāgārjuna, and several others who were proficient even in medicine.

Nalanda

Nalanda was another centre of learning, which flourished between the fifth and the twelfth century A.D. Chinese pilgrims, Huien Tsang and Yi-Tsing, who came to India during the reign of emperor Harsha and a little later, have left their impressions of Nalanda. Huien Tsang stayed in India between 629-645 A.D. and spent five years as a student at Nalanda. Yi'Tsing sojourned in Nalanda for ten years between 675-685 A.D. Huien Tsang states that students from China, Korea, Tibet, Bokhara, Mongolia and Japan came to Nalanda to learn, and they went back to their countries "highly learned". Admission to Nalanda was difficult, only about twenty per cent admission-seekers could be admitted. To be a student of Nalanda was in itself an academic distinction, and those who bore the title of 'Nalanda Brother' were treated with respect all over the world. Many Acharyas, who were teaching in Nalanda, went out of India to China, Java, Sumatra, Tibet, Nepal, Korea and other places to preach the doctrines of the Buddha, for translating leading works in foreign languages, for founding monasteries, for warding off evil spirits, for improving foreign scripts, and for advanced studies; or they often took with them *stūpas*, replicas, images, seals and manuscripts in large numbers. Sometimes, objects of

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trade including spices and herbs and allied materials entered those countries along with religious materials. All these must have resulted in a socio-religious, scientific and cultural contact and exchange between India and the other nations. In this exchange, Indian medical knowledge and practices, too, made their way into those lands.

EUROPEAN CONTACTS

European contacts with India and Ayurveda began from the end of the fifteenth century, with the arrival of the Portuguese and later the Dutch, the French, the Danes, and the British in the 17th and 18th centuries. It was the British, who entered India in the 17th century, had acquired a dominant position, and expanded their rule in India till the middle of the 20th century.

His Majesty the king of Portugal dispatched in 1497 Vasco da Gama with instructions that he should at all costs discover India by the route of the cape of storms, subsequently known as Cape of Good Hope. Vasco da Gama came along that route and sighted the coast of Malabar on 17th may, 1498, and on the 27th of the same month cast anchor at Calicut, where he established a 'factory'. He was back in Lisbon by September, 1499, carrying a letter from the Zamorin, the Hindu ruler of Calicut, to the King of Portugal, which read as follows: "Vasco da Gama, a gentleman of this house, came to my country, of whose coming I was glad. In my country, there is plenty of cinnamon, cloves, pepper and precious stones. The things which I desire to have out of thy country are silver, gold, coal and scarlet".

Vasco da Gama received friendly treatment from the Zamorin. His discovery of the sea route to India had far-reaching repercussions on the civilized world. It brought Portugal in direct maritime touch with India.

The Portuguese, besides taking away spices to their country, established a medical school and a Royal hospital at Goa for treatment. As many soldiers died due to diseases, the administrators thought of teaching medicine to the locals and learnt in the meantime that, 'the natives were very quick-witted and had the gift of learning, and would not be of the worst and so the hospital would have many doctors to help one the cure of diseases of the soldier'. Thus, a basis of teaching medicine in Goa was laid. The teaching began there in 1703 in 'Goa Medical School' teaching Western medicine. Some of the physicians, who came to teach and settled here to practice, besides collecting a huge amount of data on the Ayurveda medicines, wrote many books.

During the reign of Louis XII (early 16th cent.), certain merchants of Rover fitted two ships to sail to the East, but were never heard again. The French dispatched no further expedition until 1604, when Henry IV granted a Charter to a company proposing to trade with India. In 1668, *La campagnie en Indes* established the first French factory in Surat. In 1701, Pondicherry became the headquarters of the French in India, who later established a very good hospital at Pondicherry catering Western medicine to the people. They did not seem to have endeavoured to collect information on Ayurveda.

The onset of the British commenced with the Charter given to the association of merchants adventurers by Queen Elizabeth I on 31st December, 1600, and a second

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Charter was granted by King James on 31st May, 1609. The first fleet of the company set out for the East in December, 1600, which consisted of four ships and each contained a surgeon, some medical officers and necessary medical equipment. In 1698, the British established the East India Company. The British started ruling India under three provinces called Western Presidency, Madras Presidency and the Presidency of Bengal.

Each of the presidencies constituted a Medical Service and, in 1895, the three armies and the Medical Services were amalgamated. A medical college came into being in Calcutta in 1835. At Madras, a medical school was established in 1843, and in 1855, it was raised to the status of a medical college. In Bombay, the Grant Medical School came up in 1845. At that time, instruction in Ayurveda and in the classic systems of medicine was imparted to some extent in a few institutions. In 1822, a 'Native Medical Institution' was established in Calcutta, which offered a three-year course in Urdu. In 1826, the Sanskrit College there was running medical classes on traditional medicine. In course of time, the Ayurvedic classics—the *Caraka* and the *Suśruta saṃhitā*—and other works were studied together along with modern medical treatise.

The physicians of the East India Company and army officers did a great deal of service to document various resources and experiences of the indigenous medical practitioners, and preserved them for further researches and usage. They brought out some pharmacopoeia and dispensatory editions by taking home the information collected in India and publishing them. These publications are of great help even today for researchers interested in Ayurveda.

For example, a *Pharmacopoeia of India* prepared by E.J.Waring was published, in 1868, in London, with a two-fold objective: (i) to bring to the notice of the professionalists in India those indigenous drugs, which European experience had shown to be of value, and which could be employed as efficient substitutes for imported articles; and (ii) to publish a pharmacopoeia re-modelling the Bengal pharmacopoeia of 1844 and embody, and combine within it such supplementary matter of special value in India as should adopt it to meet the requirements of the Indian medical department.

Two centuries earlier, Garcia da Orta, a Portuguese and the earliest European scholar physician who practised in India, wrote a book on the Simples and Drugs of India in the form of a dialogue, according to the fashion of the day. This was published in Goa in 1563. Dr. Ruano, an eminent scholar, in reply to the question of da Orta "why have you come to India?", answered: "I came with the great desire to know about the medicinal drugs and other medicines of this country. I also desire to know how the native physicians use them". Ruano stated further: "some physicians who came to Spain neither gave me the information I wanted, nor satisfied my understanding. But I know when you talk to me, all you say is worthy of being written down".

The book has forty-nine chapters; in each Garcia takes up one Indian plant and provides details about it. It starts with aloes and amber, goes through opium and sandal, *tutia* (zinc sulphate), and ends with *zedoary* (Curcuma zedoria).

Garcia da Orta was the first to describe the Indian plant, now known as *Rauwolfia serpentina*, so named in honour of Leonhard Rauwolf (1540-96), a German physician, botanist and world traveller, who described 500 plants he collected during his travels in

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India and elsewhere. This book was also translated and published into Latin, Italian and French; its English translation was published, in 1913, in London. Garcia's treatise and other such works were meant mainly to quench the thirst of knowledge of European scholars about the medicines in India, and also to propagate this knowledge from India to the European countries.

The medical officers of the East India Company painstakingly collected the information about medicinal plants of India as well as on the use of the 'bazaar medicines'. By the term 'Bazaar Medicines', they meant the drugs sold by vendors as being specific to certain diseases. The first to use this term was Dr.Royle of Bengal Medical Service.

Hendrich Adrian Von Rheede of the military service of Dutch East India Company, published a monumental work, entitled *Hortus Malabaricus*, in twelve volumes with 794 plates (1686-1703) in Amsterdam. He was assisted in collecting the botanical notes by many local learned Ayurvedic pundits including Itty Achuthan, under direction from the Raja of Cochin. Von Rheede's book was the first systematic work by an European giving the medicinal uses of Indian plants.

Early in the nineteenth century, in an article entitled *Catalogue of Indian Medicinal Plants and Drugs with their names in the Hindustani and Sanskrit languages*, published in 1812 in the Asiatic Researchers, the author John Flemming for the first time collected all the scattered information on the subject of Indian medicinal plants. He placed it before the medical profession for scrutiny and use. This catalogue was chiefly meant for the use of European medical officers arriving in India.

DISSEMINATION TO THE WEST IN THE NINETEENTH CENTURY

It is indeed significant to note that much before the realization of the hazards of modern fast life, specially in the post-war period, the concepts of Ayurveda were well recognized in the West as well as in far-off America. The establishment of *Caraka Club* in New York by the members of medical profession in 1898 stand out as an example of the interest in Ayurveda in America. It was named after *Caraka*, the most celebrated redactor of an Ayurvedic classic, *Agniveśa saṃhitā*.

Even from the beginning of the 19th century, many western scholars started studying Ayurveda and writing commentaries, translations and articles. In 1837, Royle wrote an essay on the antiquity of Hindu medicine, which was published in London. Between 1844 and 1847, Hessler translated the *Suśruta saṃhitā* into German in two parts. In an article published in *Lancet* in 1846, Wise had studied and detailed the Indian medical knowledge. In the same year, Stenzler published an article on the history of Indian medicine. During 1858, Brain also wrote in Paris an article on the history of Indian medicine. Five years later, Lietard published from the same city, a bibliography of writers in Indian medicine. In London, Wilson wrote, in 1864, on the medical and surgical sciences of the Indians, and Roth, a German, wrote a monograph on *Caraka* in 1872. Seven years after this work, a book on the *Ancient Indian Life Science* was written and published by Zimmer from Berlin. Garbe wrote in German on the *Indian minerals* from Leipzig, in 1882. In 1896, Cordier translated *Aṣṭāṅgahṛidaya Saṃhitā* of *Vāgbhaṭa* in French. From Anantarivo, he

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wrote on *Nāgārjuna's* contribution to *Uttara Tantra* of *Suśruta saṃhitā*, in the same year. In 1897, Daremberg published an article titled Medicine in *Caraka* in the Bulletin of the Academy of Medicine, Paris. The monumental writing of Jullius Jolly, *Medizin*, in German was in 1901. Hoernle contributed a great deal of writings on English translation of Bower's manuscript; osteology in Ayurveda; and the authorship of *Caraka saṃhitā* between 1895 and 1908. In 1910, Neuberger, in his *History of Medicine*, included a detailed chapter on Indian medicine.

IN THE TWENTIETH CENTURY

Throughout its history, Ayurveda has been exposed to external constraints and influences which contributed to a progressive loss of important theoretical and clinical Ayurvedic knowledge. From the middle of this century, however, there has been renewal of interest, which has gained momentum in the last several decades. This has many key players—from individuals to institutions. Among them the leaders were Pandit Shiv Sharma in the foremost and Maharishi Institute, under the direction of Maharishi Mahesh Yogi, who introduced Ayurveda through his earlier programmes of Transcendental Meditation (TM) and belongs to the later group.

Shiv Sharma

Although the influence of Maharishi in the West was felt in the late sixties and early seventies, the one-man mission that took Ayurveda the far eastern and western parts of the globe was its noted exponent, Pandit Shiv Sharma. He was not only an eminent *vaidya*, but also a parliamentarian and an emissary of Ayurveda. His presence was felt throughout the world wherever he visited and delivered lectures on Ayurveda.

He went to Ceylon (now Sri Lanka) in 1955, on an invitation from the All-Ceylon Ayurvedic Practitioners' Congress, to participate as chief guest in one of their crucial annual sessions. This was specially called to counter such administrative measures as threatened to affect the development of Ayurvedic education and practice in the country adversely. The impact of Shiv Sharma's visit to Ceylon was staggering. *The Times of Ceylon* published a special article featuring Shiv Sharma equating him within his field of activity, with Nehru, Radhakrishnan and Tata, and also published a series of eight detailed articles by him on Ayurveda. Within a year, the Government of Ceylon officially invited Shiv Sharma to advise a committee on Ayurvedic education to be initiated in Ceylon. He was very close to the late Ceylonese Prime Minister S.W.R.D. Bandaranaike, who was assassinated three days short of conferring the title of Ayurveda Cakravarthy on Shiv Sharma. As an advisor, Shiv Sharma was responsible for establishing the Bandaranaike Memorial Central Ayurveda Research Institute at Navinna, Ceylon, which was dedicated to research and education in Ayurveda.

Shiv Sharma was invited to deliver a lecture at the UNESCO-SASCO-organized symposium on medicinal plants at Candy, Ceylon, in 1964. The lecture evoked an

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enthusiastic discussion. The anti-diabetic Ayurvedic herb *Salacia chinensis*, which was introduced by him, had never been discussed at any symposium in India or abroad.

In 1964, Shiv Sharma went to Toronto, Canada, and delivered talks on Ayurveda in the context of modern societies. These lectures made such an impact that the media praised him for the impressions created on the Western philosophers and psychologists by his views. He also appeared on television in Toronto answering various questions on the subject of Ayurveda. Later, he delivered a talk on Ayurveda at the Rochester University Medical Centre (New York), which was greatly appreciated. The curiosity of American doctors to understand Ayurveda was thus roused by Shiv Sharma. One of the American scientific writers and researchers, Alberto Dimascio from the Psycho-pharmacology Research Laboratory, Massachusetts Mental Health Centre, Boston, showed a great interest in and eagerness to understand the *Tridoṣas*, *Prakṛti* and other Ayurvedic concepts, so as to apply them in his practice.

When Shiv Sharma went to Jerusalem to attend the 20th World Vegetarian Congress in 1969, he was taken to Tel Aviv by the eminent Israeli statesman Moshe Ishai of Ihilov Medical Centre to address the staff of hospitals on the subject of Ayurveda. The curiosity and enthusiasm of young Israeli doctors was refreshing and inspiring. During this trip, he delivered 14 lectures, which were attended by a large group of medical men, naturopaths, yoga teachers and citizens.

In 1970, an eminent Swiss physician, Ernst Jucker, was a member of the WHO delegation, which had come to study medical science in India. He was interested in the theory and practice of Ayurveda. Shiv Sharma and Jucker had lengthy discussions on Ayurveda, and the latter asked Shiv Sharma to write a detailed article on Ayurveda medicine. As a result, Sharma wrote *Ayurveda—Past and Present,* which was published by Birkhauser Verlag in Basel, Switzerland, in 1970, as part of a larger publication: *Progress In Drug Research*. In no time, this paper became internationally famous. Even the National Institute of Health, Bethesda, Maryland, USA, officially requested Shiv Sharma for its copies.

Helen Vale Foundation of Australia had organized a hectic programme of 120 lectures on Ayurveda by Shiv Sharma in 1970, during his forty days stay in Melbourne, Sydney, Brisbane, Canberra, and various camps away from these cities. This elicited the following remarks from Professor Charles Leslie of the New York University (who is known to most of the Ayurvedic scholars in India): 'I would not believe that one man could do it, if I did not know his tremendous energy'. In this extensive lecture tour of Australia, Shiv Sharma was associated with a brilliant and popular modern doctor from Melbourne, who was closely evaluating Ayurveda. Of these 120 lectures, 54 were on a course entitled '*Guidelines for living in an affluent society*'.

On his way back home, Shiv Sharma was invited to deliver the Annual Extension Lecture at the University hall under the presidentship of Madam Teresa Malietoa, the Director of Extension Services, University of South Pacific. He spoke on '*The Ayurvedic medicine and Yoga for the Modern Age*'.

Shiv Sharma also visited Japan on an invitation from Doctor Yasuo Otsuka of Tokyo University and Professor Hiroshi Maruyama of Medical School, Osaka University, and

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delivered lectures at Kyoto and Osaka. This was also organized by The Society for the Study of Ayurvedic Medicine in Japan, which had been founded by Maruyama in 1969.

There were several other noted exponents of Ayurveda, who travelled abroad to spread the message of Ayurveda. Among them special mention needs to be made of: C. Dwarakanath, who went to European countries to deliver lectures on Ayurveda; K.N. Udupa; Bhagwan Dash and R.H. Singh.

Maharishi Mission

Although many Ayurvedic scholars have contributed their best to propagate Ayurveda in the modern world, considerable credit for popularizing this ancient medical system should go to the vision and zeal of Maharishi Mahesh Yogi. Beginning with teaching Transcendental Meditation (TM) to the distressed affluent world, who found it as a hope for stress reduction, Maharishi transformed the TM movement towards positive health-care and healing system through Ayurveda, which is even today branded as 'Maharishi Ayur-Veda' (MAV). With three senior most *vaidyas* as promoters, MAV has endeavoured to establish its franchize all over the world, especially in Europe and USA. One of the three *vaidyas,* Pandit Brihaspathi Dev Triguna, who is an exponent of *Nāḍī Parīkṣā* (pulse diagnosis), toured the world establishing the people's faith in Ayurveda. Many medical doctors and media persons have been bewildered by the accuracy of pulse diagnosis by Pandit Triguna.

In addition to the establishment of treatment centres in different parts of the world, wherein the special Ayurveda treatment called *Pañca karma* are being provided, MAV also offers a range of herbal Ayurvedic products for healing at these centers. The special MAV products (MAP), called as 'Maharishi Amruth Kalash' (MAK), have attracted the attention of pharmacological and clinical researchers to look into the special benefits of these products in geriatrics, stress disorders, etc. Experimental work on MAK prompted the US National Cancer Institute (NCI) to include these compounds. More than eleven NCI-sponsored studies are now being undertaken. Besides these products, MAP also sells aroma oils for *vāta, pitta*, and *kapha*, the tri-basic energy systems according to Ayurveda; herbal teas for these energies; soap; incense sticks and the like which are now available in most parts of the world.

Apart from these, Maharishi Ayurveda also conducts periodically certain types of orientation courses for medical doctors in Ayurvedic concepts, therapies and practices. Many eminent doctors have attended these weekend courses and have become exponents of Ayurveda, and their abiding interest in Ayurveda has been amplified through these courses. The conferences on MAV and its herbal compounds have been approved for the Continuing Medical Education (CME) credits by the American College of Preventive Medicine, which can be counted for recognition by the American Medical Association, and for medical re-licensure in many states.

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Seers of the New Age Ayurveda

These educational programmes have indeed benefited many. Specialized doctors in other nations and US have become disciples of Maharishi, and created new atmosphere of Ayurveda through their practices and popular writings. Among them, one savant, who has made a big impact on the people all over the world and who is even today recognized in the media as the 'New Age Guru', is Deepak Chopra. He is verily an emissary of Ayurveda who, now in his fifties, has been ceaselessly endeavouring to establish Ayurveda in the USA. An Indian residing in the USA and son of the seniormost consultant cardiologist (Col.) K.L.Chopra at Moolchand Hospital, New Delhi, Deepak Chopra is an endocrinologist practising in Boston (USA) since 1971 and also an Assistant Clinical Professor at the Boston University School of Medicine as well as the former chief of staff at New England Memorial Hospital, Stoneham.

Deepak Chopra is no psychic, but he does see health patterns in Ayurveda that are invisible to his Western-trained colleagues in Boston. A practitioner of internal medicine, he is also an adept in Ayurveda. He speaks about Ayurveda with the excitement of a discovery in his voice: 'Any one with an interest in natural medicine will be astonished by the depth of Ayurveda'. He says: "It has already earned a prestigious position in the history of medicine, because it founded many of our concepts of hygiene, disease prevention, anatomy and surgery. But the move from the textbooks of the Doctor's Office in the USA is just happening now. That is where, the discoveries are coming in the form of new treatments, and they hold enormous promise".

In 1981, Chopra picked up a book on TM and experienced within himself the positive benefits in terms of keeping away from vices and a feeling of inner contentment. With his own experience, he started recommending TM to his patients for stress management, and they subscribed it, too. Later, he was able to convince his father, who had dismissed TM as a Western gimmick, that he should learn to meditate. As a result, the older physician had been able to control his hypertension without medication. In the process, Chopra joined the movement of Maharishi Ayurveda to learn in depth. Soon, Chopra immersed himself in Ayurveda and began to speak as its advocate at medical schools around the USA, including Stanford, Haggard, and Yale. He also started writing his own Westernized explanation of the role that mind plays in health. "I approached the subject basically as the brain chemistry of happiness. That is really the essential message of Ayurveda, that the same bio-chemistry which creates happiness can be utilized effortlessly to create health", he exhorted.

On the issue of an objective approach supposed to be a characteristic of Western medicine, Chopra maintains that the outside work can never achieve complete results. It works best for repair, which is what most surgery is or for acute interventions with drugs. Health is an inner fact of life, however, not an outer fact. That is why the subjective approach of Ayurveda is equally valid. In 1986, Chopra left his position at New England Memorial Hospital, and closed down one of his private clinics in order to devote his energies to Ayurveda. He has trained several dozens of American physicians in the principles of Ayurveda. He was the director of the Maharishi Ayurveda Health Center in

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Lancaster, a suburb 80 km away from Boston. A 56-room bed hospital was the first in-patient Ayurvedic facility in the US.

Deepak Chopra observes that "introducing Ayurveda is like standing in the middle of a knowledge explosion, so much of which is totally new to American physicians. Western medicine does not even have the right concept to explain things like purification (*śodhana*), seasonal rhythms (*ṛtu caryā*), or the kind of individual body types (*prakṛti*), that Ayurveda has been dealing in for centuries".

From the day of his total involvement with Ayurveda, he has become a friend and spiritual advisor to a string of superstars, from Michael Jackson to Demi Moore and George Harrison. His books (15 best selling) dominated *New York Times* Best Seller Lists. These have been translated into 25 languages, and he has recorded over 30 audio cassettes (which have combined sales of 5 billion copies). His photograph has even been laminated and packaged into Ayurvedic lotions, potions and beauty products. He has recently signed US $ 14.5 million contract with Random House for his next three books, and is already gazing off into the future to find the new and ever more off-beat ways to communicate. He charges $ 25,000 an hour for his lectures and has been honoured with a string of prestigious awards. In his fifties, Deepak Chopra is certainly the Wizard of the West.

Hailed as the 'Power Guru' in the USA, he is everywhere, in cyberspace, on televisions, at seminars, workshops, and documentaries. Buoyed by his successes, Deepak Chopra is ready to carry Ayurveda to any receptive audience. He feels that Ayurveda will become indispensable in the future of American medicine, because it has something that is indispensable at all times, a vision of wholeness. He says: "In this country (India), we have superior wisdom. Once we combine the two (Ayurveda and wisdom), we will create something unique. For the first time, we will have total medicine".

American Vedic Seer

On similar lines to those of Deepak Chopra, there are several others who have steered the development of the so-called New Age Ayurveda. Leaders amongst them are quite few. David Frawley, being one of them, has been considered as teacher in natural healing in America. Frawley has a twenty-year background in natural healing, including the systems of Ayurveda, Chinese medicine, and Western herbalism. He is also associated with the Ashtanga Ayurveda College, in Pune, and other Ayurvedic schools in India.

Frawley is also a teacher of yoga and meditation. He is the author of a number of best-selling books on different aspects of Vedic knowledge, including 'Ayurvedic Healing'. These books have been published in the USA and in India. He writes regularly for various Yoga, Ayurveda and Hindu publications, both in USA and in India. Currently, as the Director of the American Institute of Vedic studies, he conducts correspondence courses in Ayurveda.

Another able exponent of Ayurvedic medicine in the USA, is Vasant Lad, who has brought with him a wealth of classroom and practical experience to the USA. A native of India, Lad served for three years as medical director of the Ayurveda Hospital in Pune. He

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also held the position of Professor of clinical medicine at the Pune University College of Ayurvedic medicine, where he taught Ayurveda for 15 years. Lad's academic and practical training included the study of western medicine and surgery as well as traditional Ayurveda. From 1979, he travelled throughout the USA sharing his knowledge of Ayurveda and, in 1984, he returned to Albuquerque as Director of Ayurvedic Institute. Lad is the author of *Ayurveda: The Science of Self-Healing*, which is a best seller both in the US and India, and has also published many articles on various aspects of Ayurveda. He has travelled extensively in North America, through the year, as private consultant and giving seminars on Ayurveda, its history, theory, principles and practical applications.

Several Westerners came to India with a curious mind to learn Ayurveda and attended short-term programmes. The first American student to take up serious study of Ayurveda in India was Robert V Svoboda. Influenced by the teachings of Vasant Lad in the USA, Svoboda joined a regular six-year course at the Tilak Ayurveda Maha Vidyalaya at Pune. He also employed a private tutor to give him extra lessons in Sanskrit. His professors were delighted to see him learn exceedingly well thus becoming the only Westerner till date to have completed a formal course in Ayurveda. After returning to the US, he joined Lad and wrote the book *Prakṛti: Your Ayurvedic Constitution*, published from Albuquerque in 1988. This book was so popular that many in America, started referring to it for analysis of their constitution, and several physicians in the country welcomed it whole-heartedly. Later, in 1992, he wrote a book: *Ayurveda: Life, Health And Longevity*, which has been acclaimed as the best book for exploring the Ayurvedic science, to achieve optimal health and life span. Writen by a western author in lucid English, it is a must for beginners to know about the rare and positive benefits of every day routine, as described in Ayurveda literature.

Some Indians, who have settled in the USA, though not in the field of medicine, have achieved great success in healing and propagating the natural and spiritual laws of health. One of them is Bri. Maya Tiwari. About 20 years ago, she healed herself of cancer through her fortitude and spiritual strength. As a result, Maya redirected her life towards holistic studies on Ayurveda. Later, she turned to her roots in the Vedas, and was carefully tutored by Swami Dayananda, one of India's few living masters of traditional teaching of Vedanta and Sanskrit. She has been trained to preserve the precious verbal or vocal teachings of the most ancient spiritual heritage, the Vedas, and has since devoted her life to the study and teaching of Ayurveda and Vedanta.

In 1992, Maya was initiated by her teacher as a *bramhacāriṇī*, one whose life is committed to the study of the Vedas. Being a traditional Vedic monk, Maya leads a simple life in Asheville, North Carolina, and teaches with love and selflessness the ancient wisdom of *sādhanas*, the art of consciously participating in the wholesome activities of Nature. Over the years, she has assisted hundreds of cancer patients. More recently, some AIDS patients, through their 'dark night of the soul', are stated to be in good health.

In 1991, Maya co-authored *Diet for Natural Beauty*, with Aveline Kushi. In 1994, she wrote the best-selling *Ayurveda: Life of Balance*, a definitive work on Ayurvedic nutrition. In 1995, she has also authored *Ayurveda: the Secrets of Healing*, which is a seminal work, the basis of which is deeply rooted in the scriptural knowledge behind Ayurveda. This

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book is a most complete offering of the original cleansing and rejuvenating therapies, *pañca karma*. She is probably the first Western author to have revealed the sophisticated and timeless healing processes. In a way, that is comprehensive and readily acceptable and adaptable to modern western culture.

Disciples of Ayurveda

Apart from Indians in America and some Americans who could augment the popularity of Ayurveda, there were some other Westerners, who are deeply interested in learning Ayurveda. To mention a few are: Glen W. Davidson, Associate Professor of Culture and Medicine at Southern Illinois University School of Medicine; Professor Charles Leslie, who was specially deputed to India under the Fulbright scholarship scheme to study some aspects of Ayurveda. He stayed in the campus of BHU to write a book on the History of Ayurveda during the last 200 years. His other book, *The Modernisation of Asian Medical Systems*, is very informative and fascinating.

G. Jan Muelenbeld is a popular psychiatrist at Bedum. He developed interest in Ayurveda through his association with the Institute of Indian Studies (IIS) at the State University of Gröningen. He later studied and surveyed the Indian literature in Sanskrit on Ayurveda. Being a scholar in Sanskrit also, Meulenbeld has translated critically and medically the *Mādhava Nidāna*, the text on diagnostic methods, which was published in 1974 (only the first ten chapters have been translated with notes in English along with its chief commentary).

He was the general chairman for the international workshop on priorities in the study of Indian medicine, organized by the IIS, held at the State University of Gröningen in 1983. Scholars working on Ayurveda from Germany, France, and England attended this workshop, at the end of which, it was by decided unanimous agreement to found European Ayurvedic Society and to elect Meulenbeld as its first President.

Frank Ros from Australia came to Pune to study Ayurveda, and later became a fellow of the prestigious Indian Ayurvedic Research Establishment of the Institute of Indian Medicine, Pune. He is regarded in Australia as an Ayurvedic physician and an acupuncturist of many years of standing, and is based in Adelaide, South Australia. He has written a book: The *Secrets of Ayurvedic Acupuncture,* published in USA. He has been teaching Ayurveda and acupuncture at the Australian Academy of Natural Medicine in the faculty of Ayurvedic medicine, Enfield, South Australia. He is of the opinion that Ayurvedic acupuncture probably originated from the Indian (Ayurvedic) surgery.

AYURVEDIC INSTITUTIONS ABROAD

With the official recognition of Ayurveda as one of the possible means of treating various diseases by the World Health Organization, UNICEF and USAID having promoted the use of Ayurveda in child survival programmes rigorous evaluation of Ayurveda is being done in the USA (National Institute of Health), Russia and Japan. Many institutions,

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organizations and service centres have come up in recent times in many parts of the world, specially in the affluent countries. Some of them are mentioned below.

America and Canada

American School of Ayurvedic Sciences, Bellevue, Washington, was established by Virender Sodhi, a post-graduate in Ayurvedic medicine. This school provides medical training for physicians and health-care practitioners, and offers courses for lay people. It is also attached to Sodhi's Ayurvedic and Naturopathic Medical Clinic.

The Ayurvedic Institute, Albuquerque, New Mexico, was set up by Vasant Lad (who is its director as well) to promote an understanding of Ayurveda. It offers certificate and correspondence courses, seminars, including *Jyotiṣya* and Sanskrit, besides publishing a quarterly journal, *The Ayurveda Today*. The Wellness Centre, incorporated within this institute, offers consultations in *pañcakarma* and other Ayurvedic treatments. The Herb Department dispenses herbs, and herbal compounds as well as Ayurvedic tinctures, oils and other products. Books, pamphlets, audio and videotapes on Ayurveda are also available in this institute.

American Institute of Ayurvedic Studies, Santa Fe, New Mexico, was started by David Frawley. This institute offers, among others, Ayurvedic correspondence course. Books and information on Ayurveda, Yoga and Vedic sciences are also available at this institute.

The College of Maharishi Ayurveda Health Centre, Fair field, Iowa, provides referrals to health centres, which offer methods for prevention and treatment of a broad range of diseases. This Centre also trains practitioners, and provides information to the lay public.

Invincible Athletics, Lancaster, Massachusetts, teaches the methods for Ayurvedic principles, releasing stress and building a feeling of well-being and chiropractic methods into athletic conditioning.

Sharp Institute for Human Potential and Mind-Body Medicine, San Diego, California, established by Deepak Chopra, has three components: a) Patient care at the Centre for Mind-Body medicine, where Ayurvedic and other complimentary therapies are offered in out-patient and residential settings, b) Courses in the mind-body and Ayurvedic medicine for the general public and health-care providers; and c) Research to validate the effectiveness of Ayurvedic therapies.

Canadian Association of Ayurvedic Medicine, Ontario, Canada, is a professional organization, which maintains a referral list of Canadian Ayurvedic doctors, supports university-based research, and submits proposals to provincial and federal governments advocating research in and practice of Ayurveda. It also provides training in Ayurveda for physicians and the general public.

The Maharishi Ayurveda Health Centre, Ontario, Canada, is a residential treatment centre offering Ayurvedic treatments and education.

The *National Institute of Ayurveda Medicine*, New York, was set up by a physician in conventional medicine, Scott Gerson, who has undertaken post doctoral studies at BHU, Varanasi India. the Institute has conducted scientific researches on the efficacy of Panca Karsna theragies.

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Great Britain

Ayurveda Company of Great Britain (ACGB), London, offers a four-year degree programme in Ayurveda in partnership with the prestigious Wolfson College of Health Sciences and Themes Valley University of London. It is the first of its kind offered in the West outside India and Sri Lanka. It's faculty includes senior Professors of Ayurveda from India, Ayurvedic as well as Western doctors. The purpose of this course is to spread the correct knowledge of this medical system to Western students and to inhibit unqualified practitioners.

Ayurveda Medical Association of U.K., London, founded by Shantha Godagama, an Ayurvedic physician trained in Sri Lanka and the President of this Association, to which is attached the Hale Clinic which offers special Ayurveda treatments such as *pañca karma*. The Association is also involved in conducting courses and seminars in Ayurveda, besides publishing *Ayurveda News* from Exeter.

Ayurveda Medical Center, London, established by Sathya Moorthy offers programmes of Ayurvedic education and treatments.

Maharishi Ayur-Veda College of Natural Medicine, London, has been offering one-year advance training course in Vedic techniques. Roger A Chalmers is the Dean of this College, which was esablished by the World Medical Association for Perfect Health, of which he is also the President. The course is aimed at imparting systematic training in Maharishi Ayur-Veda to medical doctors to enable their national health services to achieve the fundamental goals of prevention.

Europe

Ayurveda has become popular in most of the European countries as a result of the efforts of *Maharishi Ayur-Veda* being operated from the Netherlands. It began as teaching institutes of TM, which also started MA Products. Most of the centres are in Germany, but they are wide-spread in Switzerland, Austria, Spain, France and other places. Apart from the *Maharishi Ayur-Veda*, there are several European individuals, specially in Italy and Germany, who have developed interest in Ayurveda through contacts with Indian Ayurvedists visiting their countries. The interest in Ayurveda has been increasing in Europe, where some affluent Europeans are establishing health centers by financing such projects.

Germany: From the earliest times, Germany's cultural, linguistic and social relationships with India has resulted in enjoying the scope and a feeling of 'at home' for Ayurveda. There are as many as 72 ' learning institutes' of TM and Ayurveda in this country, which are franchises of Maharishi Ayur-Veda programme. There are 9 'Klinik'- hospitals, which offer the services of *pañca karma* treatments of Ayurveda along with selling MA Products.

Werner Wilhelm Wicker, who owns about 14 hospitals some of which are dedicated for Holistic Health programmes on the advise of Shri Satya Sai Baba (Wicker is a devotee of Shri Sai Baba), has established a Hospital for Ayurveda along with departments of

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Internal Medicine, Oncology and Psychosomatic medicine in 1995, with a bed-strength of 60. It proved to be a very popular and professional Ayurveda Centre with visiting Ayurveda consultant-doctors from India (the author is one of them). This success had prompted Wicker to open another hospital for Ayurveda, in 1998. In these hospitals, besides offering *pañca karma* therapies, the treatment package includes seminars on Ayurveda, Ayurveda cooking course along with catering Ayurveda vegetarian food in near Indian style. The latest hospital is focused on Ayurvedic management of cardiac patients, who have already undergone catheterisation and other techniques in cardiac surgery.

Switzerland: There are two learning institutes of TM, which also offers courses in Ayurveda, and there is one hospital, which provides special Ayurvedic treatment. All these are under the roof of MAV projects. In 1992, Ayurveda Research Company AG (ARC), Walzenhausen, started an Ayurveda clinic, a small but good facility treatment Centre, which is offering classical treatments based on Kerala tradition. There are therapists from Kerala, and Ayurvedic physicians also, who have been visiting the centre periodically from India. (The author had the privilege of being a visiting physician, and had written a monograph entitled *Ayurveda Therapy Guide* in 1992, published by ARC). This clinic has attracted patients not only from Switzerland, but also from Austria, Germany, Denmark, Norway, Italy and France. The moving spirit behind this venture is Hans H. Rhyner, a naturopathic practitioner, who has deep interest in Ayurveda.

Italy: Interest in Ayurveda had begun with some Ayurvedic physicians from India visiting Italy from time to time to provide medical consultations. An International Association of Ayurveda and Naturopathy (IAAN) was formed in 1984. The dedicated team of scholars devoted to the mission of spreading the knowledge of Ayurveda and yoga under the leadership of Georgio F. Barabino, the Secretary-General of IAAN, who organized the First World Congress on Yoga and Ayurveda. This was held in the Republic of San Marino in 1985—the first attempt of its kind introducing the integrated perspective of Yoga and Ayurveda based on holistic approach. The participation in this Congress of a number of internationally-reputed scholars and research workers from all over the world actively working towards the solution of present-day problems through yoga and Ayurveda was stimulating and fruitful. The message of the Congress reached many countries and a movement to make an effort to co-ordinate the activities all over the world started taking shape. Suresh Kumar of Varanasi was awarded gold medal and Jayaprakash Narayan, Bangalore, was awarded silver medal for the best paper presentations. Ever since, World Congress in Ayurveda is being held once in two years.

The Netherlands: The Institute for Indian Studies (IIS), University of Groningen, had taken up studies in Ayurvedic literature over three decades ago. With a view to appraising researchers of the this work at the Institute on traditional Indian medicine, an international workshop on priorities in the study of Indian medicine was organized in this University in 1983. The scholars, who were engaged in the study of Ayurveda from all over Europe and Britain, participated and gave an account of their work. As noted already, they decided to found an European Ayurvedic Society and elected a noted

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psychiatrist and Indologist G. Jan Meulenbeld as its president. The University of Groningen has a Department, only one in Europe, where Ayurveda is a subject of research and teaching. The work of this department had played a significant role in integrating and promoting Ayurvedic studies throughout Europe. In recognition of the need for a documentation centre for Ayurveda, the Welcome Institute for the History of Medicine, London, has been named by the European Ayurvedic Society as one of the most promising centre. The Society also has regarded the indexing of Sanskrit medical works as having been very important for the future development of research in Ayurveda, and given its full support to the indexing project being carried on in Hamburg (Germany). The Society has also recommended that priority be given to recording by audio-visual means, the traditional Indian practises of relevance to Ayurvedic studies. A periodical called *Journal of European Ayurvedic Society* (Editor: Rahul Peter Das) is being published in Germany.

The Western Pacific Region

The spread of Ayurveda has followed a similar pattern as that of Chinese medicine, involving the rational use of naturalistic theory to organize and interpret systematic empirical observations. It is widely practised in only a few countries of the region. Ayurveda is practised to a significant degree in those countries, to which substantial numbers of people from the Indian sub-continent have migrated, such as Malaysia, Singapore, Fiji, and Australia, as well as in Japan.

Australia: From the time of Pandit Shiv Sharma's extensive lecture tour of Australia in 1973, the interest in Ayurveda, thus kindled, attained new dimension by the visits of several Ayurveda physicians from India. Bhagwan Dash visited Australia to conduct certain courses in Ayurveda. This was followed by the visits of Ayurveda faculty members from Pune, which led to an interaction with Australian medical doctors, who could learn the theoretical aspects in Australia and visit India for practical sessions. Thus, many Australian doctors obtained their Degree or Diploma (even Post-Graduate degrees) from the International Open University of Indian Medicine, Pune.

Many Ayurveda-trained doctors in Australia joined hands to form an Australian Ayurvedic Medical Association (AAMA), located at Canberra. Together with the Naturopathic Practitioners Association (Australia), the AAMA started offering full time/ weekend courses in Ayurveda, with both theory and practical sessions in Australia itself. Some Indian Ayurvedic physicians, who settled in Australia, as well as Australian doctors trained in Ayurveda in India, are engaged in this joint endeavour. Some of them in the latter group, like Dr Karl Horst Poehlmann, a German medical doctor who has settled in Australia and his wife Dr Adriana Poehlmann, a bio-chemist from Romania who is an Australian citizen, are responsible for organizing these courses in Australia. They were also involved in establishing an Ayurvedic hospital in Germany.

Japan: When the former capital of Japan, Nara, was excavated, medicinal plant drugs such as *triphalā, pippalī* (*Piper longum*), and pepper (*Piper nigrum*) were found. These

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plants are not known to be grown in Japan. This indicates that Ayurveda had entered Japan long time ago. It is not clear whether only medicinal plants or even the concepts of Ayurveda were known to Japan in those days. Japan today leads in activities involving Ayurvedic studies. For instance, no nation, not even India, has produced an Ayurvedic text on so lavish a scale as the Japanese have done in bringing out a deluxe edition of *Suśruta saṃhitā* in Japanese language. Johgen Ohchihara did this translation from Sanskrit original as early as in 1934. About three decades ago, a team of doctors from Japan had the opportunity to attend a conference in Gujarat Ayurveda University, Jamnagar. Since then, monthly Ayurvedic seminars are being held in Tokyo and Osaka, and a periodical and annual Journal, which gives more information on Ayurveda is being published. These activities paved the way for establishing a Research Society for Ayurveda in Japan (RSAJ) by Hiroshi Maruyama of Osaka University Medical School. (He is still with the Society as its *honoraria* President). About ten years ago, Japan television network beamed a programme on the benefits of Ayurveda in prime time. This has further led to a new wave of Ayurveda in Japan. The Japanese media publishes articles and columns on Ayurveda, from time to time for popularizing it.

Since its inception, RSAJ has been doing a great deal of service to Ayurveda by conducting important researches like the development of a 'Pulse Machine' (visualization of pulse diagnosis), a diagnostic method of Ayurvedic *Nāḍī Parīkṣā*, for the first time ever invented in the world. This has been a great achievement for RSAJ through the research of Dr. Uebaba Kodama, an active member of the Society. Extensive studies have been conducted at Bio-iaortic Centre of Kitasato Institute, Tokyo, as well as in Tokyo Denki University, on the quantitative analysis and characterization of this diagnosis. The results were presented in the fourth World Congress on Holistic Approach: Health for All, held at Bangalore in 1991.

RSAJ has also conducted clinical and experimental research on the use of *Gymnema sylvestre* in the cure of diabetes and obesity, with its pharmaco-dynamics, which was published in Nature. Similarly, it has conducted studies on neem leaves and their benefits in the alleviation of gastric ulcer, liver diseases. A product has been released in the market as health promoter. *Guggulu* and its effect in rheumatoid arthritis have been worked out through various experiments and are available as tablets. Another noteworthy study has been the confirmation of the benefits of sesame oil massage in preventing oxidation process in the body, thus postponing senility. The Surgical Department in Toyoma University, has been engaged in a special Ayurvedic procedure, called *kṣāra sūtra*, in the case of people suffering from haemorrhoids (piles).

Ben Hatai, Professor Emeritus at Toho University Medical School, is the present Executive President of RSAJ. He offers in his clinic oriental medicine from India and China, and during the past five years, he has been applying *pañcakarma* treatments to his patients. He periodically visits India to study Ayurveda being practised in different states.

Krishna Upadhyaya Karinje, a well-qualified Ayurvedic physician, was the first Indian to do research and obtain Ph.D. in Japan, in 1991, from Okayama University. His achievements in spreading the message of Ayurveda and receiving the attention of Japanese doctors are noteworthy. Apart from delivering lectures on Ayurveda, he visited,

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in 1982, Okayama for a lecture-demonstration programme on *pañcakarma*. He also worked as an Ayurvedic specialist in R&D Medical Dept. of Misava Homes Company.

Karinje has conducted over 150 lectures and/or workshops in Japanese language and is a member of RSAJ, serving there as a *pañca karma* specialist. He has written a series of 45 articles on Ayurveda in *Okayama Zujikayi*—an economics magazine—and published his book in Japanese *Ayurveda Kemkoho* on health-promotion methods of Ayurveda, which was published in 1992, and another book: *Ayurveda,* which introduces the basic principles and speciality in Japanese language. He has also translated into Japanese *Balaveda*, written in English by V. B. Athavale.

Rural Malaysia: Among the Indian community in Malaysia, extensive use is made of the various systems of Indian traditional medicine—Ayurveda, Unani, Siddha and Homeopathy. But, Ayurveda is perhaps the most popular there. The *Vade Mecum* of Ayurvedic drugs is very extensive, and certain healers may only use some of them. Indian traditional medicines are imported to Malaysia from several manufacturing pharmacies in India. Unlike the numerous and varied healers practising folk medicine in the Philippines and Malaysia, the practitioners of Ayurveda are all qualified from the colleges in India. Malaysia is thus of special interest as it has adopted Ayurveda.

South Asian Region

Ayurveda, as a formalized system of indigenous medicine, is practised as one of the major system of traditional medicine in this region. Almost all the countries have recognized this system, and are making efforts to utilize the practitioners in their health-care delivery programmes. The status and functioning of this system of medicine in each of the countries are indicated briefly below:

Bangladesh: Ayurveda and Unani are the two main systems practised in this country. A Board has been set up at Dacca for issuing registration for maintaining the standard of the teaching institutions and for encouraging research. There are over 6000 registered practitioners, of whom over 1000 are institutionally qualified. Two institutions are imparting four-year courses in Ayurveda. There is a research institute for conducting investigations on drug action and on common diseases such as asthma. There are also Ayurvedic dispensaries run by the Zilla Boards. About 14 pharmacies manufacture Ayurvedic medicines (about 500 formulations) worth over US$1.25 million each every year.

Bhutan: There is one Ayurvedic Hospital and four Ayurvedic dispensaries, which are supported by the Royal Government of Bhutan.

Indonesia: As part of International Institute of Ayurvedic Sciences (IIAS), New Delhi, India's intensive efforts to propagate Ayurveda, the Vice President and Secretary of the Institute visited Bali, Indonesia, in 1989, at the invitation of Sukrat, and set up an

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Ayurvedic Centre there. During their stay, they also studied the traditional system and practices of Indonesia, and took steps for their co-ordination. It has been decided to establish a society for the propagation of Ayurveda in Indonesia.

Mauritius: In the early eighties, the President of IIAS made his first visit to Mauritius (which has a large population of Indian origin) with a view to exploring the possibilities of re-establishing Ayurvedic system, which had remained banned in preference to the allopathic system, because Mauritius was under the British domination. A high-level committee formed by India and Mauritius Governments discussed this aspect, and it was agreed to open an Ayurvedic Centre. The Prime Minister of Mauritius, Shri Anirudh Jagannath inaugurated this Centre, in 1985, at Calbasse, in the premises of Swami Krishnanand Sevashram. The Centre with two *vaidyas* from India soon became very popular. The Mauritius Government was so impressed with this Centre that it accorded recognition to Ayurveda by an Act of the Parliament in 1990. It also allotted 20 acres of land to plant and grow herbs and other medicinal plants—named as Shri Shiv Sagar Ramgulam Ayurvedic Botanical Garden. Owing to the popularity of Ayurveda, a branch of the Centre was also started at Cureppe. Eleven Mauritius students were permitted to receive education in Ayurveda in India.

There is one small Ayurvedic Hospital and about 10 dispensaries of Ayurveda functioning in various parts of Mauritius. The First International Ayurvedic Conference was held in 1990, which was atrtended by Ayurvedic Practitioners from all over India, the USA, France and Korea.

Myanmar: Nearly 30,000 traditional medical practitioners provide medical care to about 85 per cent of the country's population. There is a college of Ayurveda at Mandalay, which admits 50 students for the 4-year training programme. The Government of Myanmar is running one hospital and 34 dispensaries in different parts of the country.

Nepal: Ayurveda is practised in this country over a very long time. There are about 100 Ayurvedic dispensaries and a 50-bed Ayurvedic hospital in Kathmandu. About 75 per cent of the population generally resort to Ayurvedic treatment. There is one Ayurvedic College in the capital affiliated to the Tribhuvan University. Besides, there is a Director-General of Ayurveda for the administration and development of this system under the Health Ministry. The Royal Drug Research Laboratory has undertaken studies on the usefulness of medicinal plants in curing various ailments. There is also an Ayurvedic pharmaceutical unit named Vaidya Khana, which is being managed by the Government in addition to over a dozen Ayurvedic pharmaceutical concerns in the private sector.

Sri Lanka: There are three traditional systems of medicine—Ayurveda, Siddha and Unani—being practised in this country. The practice of Ayurveda is controlled by an Act (1961) of Sri Lankan Parliament. The number of registered practitioners of Ayurveda is about 10,000. There is a Government Ayurvedic College at Colombo, which provides five years of systematic education to about 150 students every year. Some colleges in the private sector have also come up recently. Since 1962, research activities have been in

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progress at the Bandaranaike Ayurvedic Research Institute, Navinna, Colombo. There are four Government Ayurvedic hospitals, 250 Ayurvedic dispensaries, run by the local governmental institutions. Several establishments on a commercial scale have been producing traditional drugs.

Thailand: In July, 1989, Shri Ved Vrat Sharma, the Secretary of IIAS, Delhi, visited Bangkok in connection with the setting up of an Ayurvedic centre in Vishnumandir. An Ayurvedic Centre was started in 1990, for which medicines were provided by IIAS. There is one Ayurvedic College in Bangkok, that was started as a private institution, but was recently taken over by the Government. There are about 30,000 practitioners of traditional medicine. Some research schemes are also being pursued to study the action of various medicinal plants. The services of Ayurvedic graduates are being utilized by the Government in the primary health centres.

AYURVEDIC DRUGS AND WORLD MARKET

Because of the popularity of Ayurveda in Western countries, it is heartening to note that Ayurvedic herbal products are now catching the world market. The global scales of these products are expected to rise from the present US$ 9 billion to US$ 40 billion, by 2010 A.D., according to the forecast of McAlpine, Thorpe and Warrier—the International Management Consultants. The European sales are at present at US$ 2.7 billion, and will increase steadily over the next five years. When these Consultants were appointed by Commonwealth Secretariat to study the five major European markets for Ayurvedic products, it was evident that Germany and U.K were the leaders in the sales amounting to US$ 2 million each, followed by Holland (US$ 0.9 million), Italy and France (US$ 0.5 million each), and others (US$ 0.1 million).

The growth in the sale of Ayurvedic products is the result of five main factors: - (i) consumer preference for natural products; (ii) concerns over side effects of modern drugs; (iii) the trend towards self-medication to overcome high medicinal bills; (iv) consumer interest in preventive medicine; and (v) strong cultural heritage of traditional medicine in the Asian markets.

There are, however, certain problems in marketing Ayurvedic drugs in Europe and other countries such as: (i) the European Union's harmonized licensing laws are written only for single ingredient allopathic drugs and do not recognize multi-ingridient Ayurvedic products; (ii) the Western pharmaceutical companies 'hijack' Ayurveda out of our country without paying any royalty, largely due to the weak monitoring of trade in medicinal plants of the wild; (iii) several companies in India export bulk medicinal plants, such as *Aśvagandha* to Europe instead of adding value domestically; (iv) the authorities in the West European Countries do not accept even scientific work done in India; and (v) Unlike in the US, where the Government encourages industry-to-industry negotiation, and where Indian Ayurvedic products have done well (with US$ 1 billion sales), the European Union rarely listens to representations from industry, but respects Government negotiators.

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To ensure the desirable quality in the Ayurvedic products, in 1993, the Association of Ayurvedic Product Suppliers was formed. Most Ayurvedic manufacturers are also members of the National Natural Food Association, and the American Herbal Products Association, and therefore are required to comply with what is called 'True Label'. In other words, the label must accurately reflect the nature and contents of the product, because they are randomly tested.

THE FUTURE OF AYURVEDA

Although for over a century the advent of Western medical practices have temporarily loosened the roots of Ayurvedic medicine in India, it has since made a comeback too the country of its origin and spread around the world, to Europe, Japan, North and South America. Many Ayurvedic conferences, sponsored by governments and/or medical associations, have taken place in Brazil, Poland, Czechoslovakia, Hungary, and other countries. In Russia, the Soviet Research Centre for Preventive Medicine oversees the Institute of Maharishi Ayur-Veda. Very recently an institute of teaching and research on Ayurveda called National Ayurveda Medicine Institute has been established in Moscow. This institute has an admission of over 20 doctors and paramedical personal, who are learing Ayurveda, taught by the visiting Indian Ayurvedic Practitioness.

Furthermore, in the US, an Office of Alternative Medicine (OAM), within the National Institute of Health (NIH) of the US Government, was legally mandated in 1992 with a budget of one million dollars to identify, research and validate Complementary and Alternative Medicine (CAM), the delivery of which has been exponentially increased during the past decade. OAM has identified Ayurveda to be among the 12 comprehensive major alternative health-care systems. About 31 reputable medical schools in the USA have some alternative medical courses in their curriculum, and the list of such programmes is growing.

Ayurveda has a significant future in the pantheon of CAM practices in the USA because: (i) it is prevention-oriented; (ii) uses diet, and life-style changes primarily and lastly, drugs in the hierarchy of treatment; (iii) it is identified as one of the major and most comprehensive systems of medicine by the OAM of the NIH, and (iv) it has been already introduced in the USA, and popularized eloquently by Deepak Chopra, Vasant Lad, David Frawley, Robert Svaboda, and other pioneers in the field.

Many herbal products like *tiphalā*, *cyavanaprāśa*, etc. are available widely at health food stores throughout the US with no adverse effects reported so far. Products by local American companies and Indian companies, sold at health food shops, comprise a sizeable market.

However, the continued success of Ayurvedic herbs and products will depend upon: (i) valid scientific research and publications in reputable scientific journals regarding the efficacy, efficiency and effectiveness of Ayurvedic drugs; (ii) further education of practitioners, medical students and the lay population about the principles and practice of Ayurveda; (iii) standardization of herbal products; (iv) continued supply of reliable products of consistently high quality; acute and chronic toxicity studies, phase I, II and III clinical trials; (v) detailed education on Ayurvedic dietary regimen, life-style changes, and

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their importance in preserving health and (vi) creation of high-quality, reliable *pañcakarma* centres with highly trained and quality staff.

Virendra Sodhi from Washington observes that 'considerable modern research has proven the efficacy of Ayurvedic herbal preparations, and research has now moved to elucidating their mechanism and sites of action'.

Groups outside the Ayurvedic community have also taken steps to recognize this established healing tradition. The WHO has recognized Ayurvedic medicine, and been supporting research and the integration of the Ayurvedic system of health-care into modern medicine. Even the *Journal of the American Medical Association* has printed a short article on Ayurveda, followed by a lively response from its readers.

In the light of this renewed interest, Lad reminds us of all that the Ayurvedic medicine has to offer thus: 'According to Ayurvedic principles, by understanding oneself, by identifying one's own constitution, and by recognizing sources of aggravation, one can not only follow the proper guidelines to cleanse, purify, and prevent disease, but also uplift oneself into a realm of awareness previously unknown'.

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CHAPTER 17

Indigenous Pharmaceuticals : The Articulation Of Modernity And Tradition In India

Maarten Bode

The different medical systems which are available in India are shaped by similar cultural, social and economic realities. In everyday practice these factors diminish the differences among these systems. Patients alternate medical options, practitioners prescribe both the indigenous and modern medicines while all systems are concerned with marketing their products.

After having sketched the Indian health market, the chapter focuses on Indian urban middle class consumers of indigenous medicines. Next, the conversion of *rāsāyanas* into modern Ayurvedic medicines will be comprehensively described. How are these therapeutic drugs reworked to make them compatible with the health concerns of contemporary Indian urban consumers? How does being Indian contribute to their efficacy? Ayurvedic pharmaceuticals embody Indian notions as well as modern production and research technology. By being modern and traditional at the same time these substances reflect the state of contemporary Indian society. This might explain at least their symbolic efficacy.

Popular culture medicine, indigenous medicines and the middle classes

Medical pluralism is part and parcel of regular health care in India. Physicians of Western medicine[1] coexist with practitioners of Indian Systems of Medicine (ISM), homoeopaths

1. Western medicine is the medical system which originated in Western Europe in the sixteenth century and has since then spread all over the globe. Logical empiricism and logical positivism, especially their application to fields like biology, biochemistry and pharmacology, have given Western medicine its epistemological base (cf. Leslie and Young, 1992). Logical positivism, often used as a synonym of logical empiricism, is the word which came into existence in the nineteenth century as a reaction towards certain forms of idealism. In Britain, this word was specially used to indicate progress based on science (*positivism* is derived from Latin in which it means true, existing in reality). In this essay, the use of the word "positivism" is mainly to indicate the paradigm which

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and naturopaths. In terms of the numbers of registered practitioners, allopathy and Indian Systems of Medicine are well matched. Both sectors consist of approximately 400,000 practitioners each. All allopathic practitioners hold a degree which is approved by the Indian government, but only about 65 percent of the practitioners of Indian Systems of Medicine have obtained an official degree in ISM. The others are registered because of their experience in practising Ayurveda, Unani or Siddha.[2]

Allopathy is structurally dominant in India in terms of power, prestige and wealth. Allopathic physicians dominate government ministries and committees and absorb 96 percent of the government's health budget (Shankar & Manohar 1995:101). The importance of government support should not be exaggerated, however, because public finances only account for 20 to 25 percent of the total health expenditure in India (Duggal *et al.* 1995:835; Mathew 1997:372).

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claims that objectivity can be reached by purging empirical facts from subjectivity as well as by adhering to exclusive logic.

Besides 'Western medicine' and 'modern medicine', the term 'allopathy' is widely used in India. Because of their inherent ethnocentrism the first two terms are not favoured by medical anthropologists. Allopathy, on the other hand, is confusing because Ayurveda heals by using medicines containing qualities, which are in contrast with the qualities of the *doṣas* which the Ayurvedic cure wants to pacify. The term, allopathy, creates in fact a dichotomy between Indian medicine and Western medicine on one side and homoeopathy, which is popular in India and which is looked upon as an indigenous system on the other.

In contemporary western literature the term biomedicine is favoured. Because of the prefix bio with its connotations of being natural as opposed to chemical, the term biomedicine can be confusing when used in the Indian context. Therefore, this term is not used in this chapter; but Indian conventions are adhered to and alternately 'allopathy', 'modern medicine' and 'Western medicine' are used.

2. According to Duggal (1997, p. 1197) in 1991 the total number of doctors with a government recognised degree was 9,200,00 out of which 43 percent were allopathic physicians (According to the *Statistical Outline of India 1996/1997, p. 195* there were 4,110,00 allopathic physicians in India in 1992.) The remaining 5,244,00 physicians are degree-holders in Ayurveda, Unani, Siddha and homoeopathy. According to the Ministry of Health and Family Welfare (MHFP 1993, p. 91) per 31/12/1989 there were 3,85,117 practitioners of Indian Systems of Medicine and 1,48,707 homoeopathic practitioners. In 1991 the output of allopathic medical graduates and post-graduates amounted to 15225 (Duggal 1997, p. 1197), while in 1989 according to MHRF Welfare, 4296 people graduated from Ayurvedic (2606 graduates), Unani (223 graduates), Siddha (150 graduates) or homoeopathic (1177 graduates) college (MHFW 1993, pp. 119,153,181) (cf. Shankar & Manohar 1995, p. 101). In the three ISM we are mainly dealing with graduates (BAMS, BUMS). The number of postgraduates in these three systems is only 140 (MHFW 1993, p. 247). Data on homoeopathic postgraduates are not available.

   Besides these Government-recognised healers, there are hundreds of thousands of traditional healers who provide general health care and deliver a wide range of services like midwifery, bone-setting, psychiatry and treatment in cases of poisoning. Of this group, the quantitative data are scarce. However, the number of unqualified rural private practitioners in U.P. was estimated at 93500 in 1990 (Duggal, Nandraj & Vadair 1995, p. 835). Though folk healers often share concepts and practices with ISM they certainly have their own regional identity. The relationship between the different traditions of folk-healing and ISM is insufficiently documented and a matter of controversy (cf. Lambert, 1992).

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A lot of mingling between medical systems has taken place in India. In terms of concepts, research methodology and diagnostic techniques, the influence of allopathy on Indian Systems of Medicine has been predominant (cf. Leslie 1992), but in therapeutic practice mutual influencing has been more balanced. Western medical physicians as well as the practitioners of ISM practice popular culture medicine (Leslie 1977: 359). Indian social practices, cultural notions and economic realities shape allopathy as well as ISM. Polypharmaceutical prescriptions consisting of modern medicines, food supplements and tonics are part and parcel of medical regimes in India (Greenhalgh 1987). Attaching great importance to digestion as well as a moral approach to illness are Indian concerns which influence everyday medical practice. The fact that extreme commercialisation of medical care has attempted to shape all medical systems in India is reflected by the observation of a medical representative who says: 'Medicine in India is all about incentives...Everywhere there is a scheme—that's business, that's medicine in India' (Kamat & Nichter, 1997, p. 124). Indeed, from the perspective of patients and their physicians, the medical systems of India seem to merge. The textbooks and research reports of modern medicine as well as Indian classical medical texts certainly do not reflect contemporary medical practice. Indeed, there is a huge difference between law (i.e. the medical texts) and reality (i.e. medical practice).[3]

In particular, integration in terms of medicines has been relatively easy and fairly widespread. There seems to be no surprise when one realises the size and the economical importance of the pharmaceutical industry in India and the equation of medical practice with prescribing drugs (Stoker & Jeffery, 1988). The importance of the pharmaceutical industry is reflected by its numbers. Sixteen thousand registered pharmaceutical firms market more than 60,000 allopathic pharmaceuticals (Rhohde 1988, p. 638). The craving for medicines has become so much that the cost of medicines hampers the purchase of food and other basic necessities (Nandaraj, 1994, p. 1685, Kamat & Nichter, 1997). It has been estimated that Indian consumers spend around US $ 3 billion on pharmaceuticals every year out of which an estimated 15 percent is spent on Indian indigenous pharmaceuticals. Most of these - mainly Ayurvedic and Unani - pharmaceuticals are produced by ten to twenty firms which hold around 70 percent of the Indian market of indigenous pharmaceuticals.[4]

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3. Cf. K. Finkler who demonstrates the transformation - due to economical, social and cultural factors - of biomedicine within a big government hospital in Mexico City. We are in need of such studies for the Indian situation.
4. This educated guess is based on published company data, interviews with managers of indigenous pharmaceutical companies, as well as on conversations with Indian pharmacists and physicians. Crude data - as well as a 'top ten' of Indian indigenous pharmaceutical companies, are with the author.

   The exact number of indigenous pharmacies is not known, but it is estimated that around 8,000 licensed pharmacies process yearly Rs. 200 crore worth of raw materials (Raghavendra Rao, 1995).

   Indeed, India's size and complexity make the collection of quantitative data an arduous endeavour. On this topic Duggal *et al.* (1995, p. 834) comment: Despite computerisation, the quality of data

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The producers of Indian indigenous pharmaceuticals have strongly influenced the developments within Indian Systems of Medicine. Most of the leading firms of today started their business in the beginning of the twentieth century. With their profits they financed colleges, conferences, translations of classic texts, compilations of pharmacopoeias, associations of indigenous healers and scientific research (Leslie 1988).[5] A pharmacologist working for a Bombay-based indigenous pharmaceutical company told the author:

> Market forces will decide on the future of Ayurvedic medicine in India. Government funds are very limited; therefore the muscle definitely has to come from the industry. Only the industry is able to finance well-equipped laboratories for research and development of Ayurvedic medicines which are in tune with the demands of our times. Adapting human pharmacology to make it suitable for researching indigenous pharmaceuticals will prove essential for the future of Indian medicine.

Over the last decade, firms which before produced only Western or herbal medicines have started the production of Ayurvedic pharmaceuticals. Tax benefits, the absence of price controls, generous profit margins, and a rise in the popularity of Ayurvedic products, account for this development.[6] The mingling of different medical traditions sometimes becomes like trading places. One gets the impression that the majority of the physicians

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has deteriorated over the years and the agencies which supply the data have become indifferent to the quality of information gathered. State health departments, health programme desks, state medical and other councils, medical colleges, hospitals, district health offices, etc., private bodies like registered practitioners, nursing homes and hospitals, laboratories and diagnostic centres and pharmaceutical companies do not comply even with the rudimentary requirements of filling the minimum returns. According to the authors who are considered as authorities in the gathering of statistical data on health, only the data pertaining to public sector health expenditures are reliable (Duggal *et al.* 1995, p. 834).

Because of indistinct borders between medicines, food and cosmetics as well as between indigenous and western pharmaceuticals, quantitative data on the size of the indigenous drug market become even more problematic.

5. The financial contributions for Indian Systems of Medicine by the Central and States Governments is modest. In the financial year 1990-1991 the total government budget for Indian Systems of Medicine and Homoeopathy was Rs. 94.9312 crores (MHFW 1993, p. 297), while in the seventh Five Year Plan (1985-1990) the total government budget for Indian Systems of Medicine and homoeopathy was Rs. 129.05 crores (MHFW 1993, p. 291; CCRUM 1995 p. 5; cf. Sankaran 1989, p. 3). (Note: This figure does not include the non-plan expenditure which is included in the figure of 1990-1991). In 1994-1995 the CCRUM - one of the research councils which is paid from the overall budget - had been allocated Rs. 524.00 lakhs (CCRUM 1995, p. 14).
6. Aggregated data on the production of Indian medicines are not available (oral communication, Darshan Shankar, Director FRLHT, Bangalore). However, there are some not very reliable (cf. note 4), data on the overall pharmaceutical production in India. According to Duggal (1997, p. 1197) the total pharmaceutical production of 1995 figures Rs. 6050 crores (US $ 1.73 billion). *Note*: these production data differ from the consumer prices which have been mentioned earlier. It is unclear this figure includes the production of indigenous pharmaceuticals, but probably it does not.

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trained in Indian Systems of Medicine—especially when they practise in rural areas—mainly prescribe allopathic pharmaceuticals (Taylor 1976; Burghardt 1988; Wolffers 1987; Kamat 1995). New consumers of Ayurvedic pharmaceuticals can be found in the urban middle classes. Nowadays it is common practice in India that modern physicians and specialists with mainly urban middle class patients prescribe Ayurvedic products (cf. *India Today*, 20 Oct 1997:77). While the industry organises fairs—like the exhibition Mystic India which was held in Delhi in October 1997—to convince middle class urbanites of the benefits of indigenous cures and medicines, the commercial manager of a leading Ayurvedic firm commented as follows on this exhibition:

> 'In Mystic India we inform educated Westernized Indians about the benefits of our Ayurvedic products. We advise them not to drug themselves and to return to nature. We give them information on Ayurvedic disease categories like *āmlapitta* (hyperacidity, MB) and propagate the usage of an Ayurvedic product which we market for this disease. We also propagate the use of *aristhas* for improving memory, sleep and vitality. After the exhibition, our medical representatives will visit MBBS-doctors to expose them to a limited number of our Ayurvedic preparations. We want these doctors and consumers to associate Ayurvedic preparations with safe and sound medical practice.'

The importance of Indian urban middle classes as consumers of indigenous therapeutic drugs is further confirmed by the content of advertisements for these products and the author's own observations and conversations in clinics and druggist shops.[7]

The marketing of a substantial amount of Indian indigenous pharmaceuticals as prophylactics and adjuvants hints that they are not for the poor who are involved in the struggle for their day-to-day survival. Allopathic medicines which give quick relief due to

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However, the data on the increase of the production of indigenous medicines can sometimes be obtained for individual companies. The author collected the following data from company publications as well as through interviews: The sale of Ayurvedic generics of one of leading companies went up from Rs. 10 crores in 1991 to Rs. 30 crores in 1996 (oral communication, Manager of this company). However, the total sales of their three best selling proprietary products, i.e. Chyawanprash, Amla Hair Oil and Tooth Powder, figured over Rs. 300 crores in 1996, (oral communication, Manager of its Research Foundation). Another leading company improved its sales from Rs. 10.5350 crores in 1985/86 to Rs. 49.8412 crores in 1993/94 and nearly Rs. 175 crores in 1996/97 (this rise can only partly be ascribed to inflation, cf. *Statistical Outline of India* 1996-97, p. 208). The largest Unani Company saw its sales go up from Rs. 74 crores in 1995 to Rs. 100 crores in 1996 (oral communication, the Junior Director, Marketing). Another indication for the rise in the popularity of indigenous pharmaceuticals is the introduction of new players in the market and the substantial number of allopathic companies which started a line of Ayurvedic products (oral communication, the Sales Manager of a company).

7. According to the former BBC-journalist Mark Tully (1992) who has spent his long career and life in India, 80 percent of the advertisements on Indian television is aimed at the middle class. This would mean that the advertisement campaigns for Indian indigenous pharmaceuticals are largely designed to seduce middle class consumers.

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symptom-suppression seem to be more compatible with the lifestyles of Indians below the poverty line. Indeed, poor people might not be primarily interested in medicines which are known as slow-acting and often are prescribed in combination with other medicines. The fact that many of them are known to be preventive rather than curative might add to this. Indian indigenous pharmaceuticals are better suited for people who can afford to invest in their health.[8] In a conversation on Ayurvedic medication for the treatment of arthritis, a marketing manager of a big Ayurvedic pharmaceutical company in Bombay expressed his views in the following way:

> 'Poor people look for quick relief. They want to suppress the pain in their joints as soon as possible, so that they could carry on with their daily activities. Middle class patients are more health-conscious and are looking for products which will tackle the root cause of the disease. Our company markets, a product which diminishes the adverse reaction of the immune system lying at the base of arthritis. Our medicine is preferable because it slows down the process of the destruction of the soft layer of mucous between the joints and can prevent future invalidity.'

Awareness of the iatrogenic effects of allopathic medicines could very well be more spread among the usually better trained physicians and druggists to whom middle class patients often turn. The chaotic drug market as well as the prevalence of dangerous prescriptions and sale practices which have led and still lead to many unhealthy situations, might have motivated these people to look for gentle alternatives.

Though it is not uncommon for poor people to spend a large percentage of their income on purchasing therapeutic drugs, their financial means are limited and this might pose a barrier for the use of products which become costly because they have to be used for weeks or months and sometimes even for a lifetime. These financial constraints become even more obvious if we realize that the costs of Ayurvedic treatments in indoor treatment centres and clinics can amount to the monthly or even yearly average income in India. A senior allopathic physician of a Bombay-based consumer organisation, commented on this trend as follows :

> Ayurveda was a preventive system for a traditional society. Herbal prescriptions, dietary rules, as well as physical and mental exercises, were all part of the Ayurvedic tradition. However, the majority of the Indian people who quite recently migrated to the cities does not have enough space to grow medical herbs, lacks access to clean water and wholesome food and does not have the scope to do exercises. This group's

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8. The range of prices for indigenous pharmaceuticals is wide. While the cheapest capsules - like remedies for cough, cold and indigestion - are available for 10 paise, aphrodisiacs can cost as much as Rs. 30 per capsule. Though allopathic painkillers can be bought for 20 paise, the most current western drugs cost around 75 paise. Because indigenous medicines usually have to be taken for weeks or months, it can easily be argued that indigenous medicines are more costly.
The author noticed that the costs of the indigenous medicines prescribed after a consultation in an Āyurvedic clinic in a middle class neighbourhood in New Delhi ranges from Rs. 300 to Rs. 400.

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life-style simply doesn't permit adherence to Indian hygienic rules. Ayurveda has become elitist because nowadays only the middle classes and the elite have the facilities to make use of it.

The elitist character of an important category of Ayurvedic treatments is reflected by the remarks of a Government-trained Ayurvedic physician who works in a rich area in South Delhi:

> My patients usually come from the upper middle class. You have to earn at least 20,000 or 30,000 rupees on a monthly basis if you can afford to pay every week the 4,000 rupees which is the current price for our treatments. The rheumatic or psychosomatic complaints of our patients will often demand a treatment which takes three to four weeks.

Thus it is essential to note the importance of the Indian urban middle classes[9] as consumers of Ayurvedic pharmaceuticals.[10] Now let us try to match consumers and therapeutic drugs. For practical reasons—personal acquaintance as well as their presence in indigenous pharmaceutical companies and clinics of Indian medicine—there is a focus on urban professionals.[11] What have Ayurvedic pharmaceuticals to offer to this important section of Indian society? How are Ayurvedic medicines reworked to bring them in line with the diseases of these consumers? What about their efficacy? Before answering these questions the literature of urban professionals needs to be understood.

Urban professionals and their lifestyle

In the past decades, life in Indian big cities has changed rapidly. Modern consumer goods such as televisions, cars, jeans, hard liquor and fast food which used to be rare, are now

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9. When newpapers and magazines discuss the importance of the Indian middle class as consumers offering prospects for the industry, their numbers range from 80 to 200 million people. This demonstrates the fact that the Indian middle class represents an uncultivated area, on which the last substantial work by B.B. Mishra (1961) deals with the Indian middle classes up to Independence (oral communication, Santosh Deshpande, Institute of Economic Growth, Delhi University).
10. In this chapter there is a focus on Ayurvedic pharmaceuticals because their sale is approximately eight times higher than the sale of Unani pharmaceuticals. However it must be noted that India is one of the very few countries where Unani medicine is taught at universities while India's Unani pharmaceutical industry is the biggest in the world and exports medicines to many countries. Indeed, Unani and Ayurvedic pharmaceuticals have a lot in common. For instance: (i) many Indian herbs are used by both systems; (ii) both of them are humoural pathologies interacting with each other for over centuries; (iii) Unani as well as Ayurveda belong to a tradition of vitalism which emphasizes the self-healing capacity of the human body.
11. Among the Indian middle classes, usually three groups are distinguished: rural farmers who have became affluent after the green revolution; urban, small businessmen; and well educated urban Indians who work for the government, the private sector or work independently as doctors, lawyers, etc.

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widely available. Where there are commodities, there must be consumers. These can be found among the urban Indian middle classes which make up an estimated 50 percent of the 262 million Indian city dwellers. A substantial number of them have at least a bachelors degree and can be found in professions such as engineering, law, medicine, teaching, the government administration and as employees in commercial firms. Their life appears to be in a state of flux. While most Indians still live in extended families, urban professionals belong to one of the strata of Indian society in which the nuclear family—sometimes slightly enlarged by an aging parent or another relative—is predominant (cf. Sinha 1993, Shah, 1996). Identity is increasingly marked by education, occupation and income (Srinivas 1995; Damle 1996) and less by traditional Indian denotations such as lineage, family and house (Bharati 1985, p. 16). Their status is a complicated mixture of achieved and ascribed aspects.[12] The urban professionals are in severe competition for admittance to high quality institutes of learning and employment. Due to job scarcity many do not succeed and unemployed engineers and doctors are in large numbers (Srinivas, 1995). Only a few of them who find jobs get a salary which offers the prospects of a modern affluent lifestyle (Damle 1996, p. 190). This state of affairs disappoints many and could easily lead to frustrated ambition and stress as the Indian sociologist, Srinivas (1995, pp. 187-88) has noticed:

> An inevitable result of enhanced opportunities for a large number of people and the prevalence of acute competition for obtaining access to resources such as education, employment and a comfortable standard of living, is the spread of stress and stress-related ailments among the people.

Because of severe competition, loss of economic and social security through the loosening of kinship bonds, as well as daily exposure to poverty which is part and parcel of Indian city life, the fear of social downfall could very well be an undercurrent in the life of many urban professionals, as this fragment from a story about middle class people in Calcutta tries to illustrate. The main character, a young boy, is confronted with the horror evoked by the living conditions of poor neighbours.

> 'There was no place for me to sit, so I slipped back outside the long verandah-like corridor. Raising myself on tiptoe, I leant on the low railing that ran along it and looked down....The ground fell away sharply from edges of the building and then levelled out into a patchwork of stagnant pools, doted with islands of low, raised

12. For example, the possession of a green card for the USA which is achieved on the basis of educational and professional merit, makes a young bachelor extra-attractive towards his parents of a daughter of marriageable age. The girl's parents are prepared to offer the bridegroom and its family a large dowry. Once the marriage is established, family members of the bride successibely emigrate to the USA where the young couple have settled. For the members of the family in which the bride was born, the green card of their son-in-law has become ascribed (as per oral communication with Klaas W. van der Veen, 1997).

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ground. Clinging to these islands were little clumps of shanties....The pools were black, covered with a sludge so thick that it had defeated even the ubiquitous carpets of water hyacinth. I could see women squatting at the edges of the pools, splashing with both hands to drive back the layers of sludge, scooping up the cleaner water underneath to scrub their babies and wash their clothes and cooking utensils.... Our relative spotted me leaning on the railing and ran out. "Don't look there!" she cried. "It's dirty!" Then she led me back inside (Amitav Ghosh, 1992, pp. 139-40).'

The closeness and omnipresence of people whose living conditions instil horror combined with insecurity concerning the possibilities to secure a level of affluence which is in line with expectations, will easily lead to uneasiness and anxieties concerning social borders. One way of tackling the fear of social downfall is by making sharp demarcations between "us" and "them". The fencing and guarding of new apartment blocks—which by themselves reflect the increase in wealth among certain sections of the urban middle classes—are a case in point. Owning such an apartment, which in Delhi are known as "housing estates", indicates that one belongs to the middle class (Jack 1997, 10). Not only apartments but other commodities like kitchen-apparatus, telephones, clothes and cars as well can establish and reflect status. These offer their owners a means of distinction.

Ayurvedic pharmaceuticals might serve this purpose. Not in a sociological but in a psychological sense. Though they are not as visible as the consumer items which have been just mentioned, they might play a role in the self-image which their consumers—as well as their prescribers and sellers - cultivate. Their consumption sometimes reflects affluence but, more importantly, intellectual sophistication and awareness. Therefore, the consumption of Ayurvedic pharmaceuticals might affirm social cadres on the psychological level of the self-image. Though this remains a speculation as long as we lack data on the importance of health-practices for the self-image of urban professionals, conversations with people of the indigenous pharmaceutical industry as well as a quick look at their promotional material provide some clues in this direction.

To understand the articulation of Ayurvedic products with the illnesses and the concerns of urban professionals we will take a closer look at a few modern Ayurvedic products.

Ayurvedic pharmaceuticals and vitalism

An important class of Ayurvedic medicines are called *rasāyanas*. They are the means for the attainment of excellent *dhātus* (vital body tissues). Through a process of distillation the first *dhātu* called *rasa* (chyle) is processed into *śukra* (reproductive essence), the seventh *dhātu*. *Śukra*, the essence of the essences of the six other *dhātus*, represents life in a condensed form. Within Ayurveda, there is a very close connection between *śukra* and *ojas*, the vital energy of an individual. Because of its non-specificity, *ojas* - like the Chinese concept of *ichi* - can easily be reinterpreted and adapted to concerns typical for certain eras and people, i.e., the medical and existential concerns of Indian professionals at the end of our century.

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Prameha, an Ayurvedic nosological category, represents the leaking of vital body constituents (*dhātu*) which creates somatic and mental weakness. On the concept of 'vital body constituents' one of the most productive and respected contemporary Ayurvedic scholars writes:

> *Dhātus* are those which maintain as well as nourish the body. They are seven - *rasa* (chyle), *rakta* (blood), *māmsa* (muscle), *medas* (fatty tissue), *asthi* (bone), *majjā* (marrow) and *śukra* (reproductive essence). The final essence of all these *dhātus* is known as '*ojas*' which has characters like those of *kapha* (mucous, one of the three Ayurvedic humours, MB) and provides the power of immunity against diseases.... *Śukra*, minutely pervades the whole body but manifestly is situated in *śukrāśaya* (seminal vesicles) and during orgasm of sexual intercourse is discharged through urethra (Sharma, 1993, pp. 8, 15).

Empirical research done in India (Morris Carstairs 1958; Nichter 1981; Bottéro 1991), Sri Lanka (Obeyesekere, 1976) and Nepal (Bode, 1994), has revealed that local traditions equate *prameha* with semen loss. *Vaidyas* define this disease as 'pathogenic leakage or emission of sperm, either voluntary or involuntary' (Bottéro 1991, p. 304).[13] Equating loss of vitality and energy with semen loss has its roots in Indian culture where an 'economy of semen' is part of the cultural hygiene. Practising sexual abstinence (*brahmacarya*) is an important Indian technique for promoting robustness and enhancing individual powers.

According to the aforementioned medical anthropologists, concerns about the loss of semen mask depression and - according to some of them—anxieties due to repressed sexual fantasies.

The social and intellectual background of Indian urban professionals makes it unlikely that they would consider the discharge of semen as a severe disorder. For educated Indians, *prameha* due to leakage of sperm becomes vitality loss due to modern lifestyles marked by consumption of Western medicines, modern food items and alcoholic drinks as well as by competition and social disharmony. For them indulgence in sex—in practice or in fantasy - is not the main cause of *dhātu*-loss but rather a westernized lifestyle in a highly competetive society.

By promoting robustness *rasāyanas* embody one of the two main targets of Ayurvedic treatment. Liver tonics besides aiming at strengthening vital tissues and functions, take care of the detoxification of the body, the second main objective of Ayurvedic treatment. The combination of cleaning and strengthening explains the popularity of liver tonics.[14]

For example, for over forty years one of the best-selling Ayurvedic formulations in India and abroad, is being marketed as a detoxifying agent which enhances metabolism. The private company which produces this, regards it as an adjuvant for protecting the body

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13. In the case of female patients, *prameha* is sometimes equated with whitish discharge (Nichter, 1981).
14. Handa, Sharma and Chakraborti (1986) discuss thirty-three 'liver-protecting drugs' produced in India, but there might be hundreds of them.

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against the side effects caused by anti-biotics, analgesics, oral contraceptives, radiation therapy and alcohol consumption. This formulation was designed to neutralize the negative somatic effects of modern treatment and western habits. Because this was, and still is, marketed for use by modern doctors, emphasis is laid on digestion and detoxification. However, these major liver functions of modern medicine link up perfectly with strengthening and cleaning the body, i.e. with the central objectives of Ayurvedic therapy. The main difference from Ayurvedic theory is the location of both functions in one specific organ, namely the liver.[15]

This Ayurvedic formulation is marketed for the prevention or the recovery of somatic lesions. Lately Ayurvedic medicines have also been marketed for psychic and cognitive disorders. A class of Ayurvedic psychopharmaceuticals have been designed.

At the end of the seventies—roughly twenty-five years after this formulation was launched in 1952, the pharmaceutical company released a product which was expected to match the former's success. Initially, the new product was marketed for the deceleration of the ageing process through the stimulation of vital bodily processes. However, over the years its marketing became increasingly focused on mental functions. An ex-sales representative of the company who owns a druggist shop in a middle class neighbourhood in Delhi, explained the situation as follows:

> 'When this new product was introduced, it was aimed at old people wanting to fight the somatic inconveniences of old age as well as for slowing down the aging process. However, over the years the age of the target group for marketing this drug came down tremendously. In the eighties, this was marketed for young urban professionals who had difficulties with keeping up with the demands of their professional life. However, around 1990 a new class of potential consumers became increasingly important. Around that time the company started to market it for students from the age of sixteen who had to take competitive exams.'

This new product has been reworked into a drug for fighting the setbacks of old age through the revitalization of body functions into a medicine for enhancing mental capacities like handling stress as well as for improving cognitive functions like grasping power and memory. Its production can be seen as a transitional stage in the development of a modern Ayurvedic psychopharmaceutical. Its predecessor was another formulation which the same company introduced in the beginning of the nineties, and designed to combat mental problems like memory-loss and anxiety as well as behavioural problems. The marketing of this formulation is aimed at students who have to take highly competitive examinations.[16]

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15. Refer Leslie 1992 for the reinterpretation of Ayurvedic concepts in the framework of western medicine. Within Ayurveda as well as within traditional Chinese medicine, bodily functions have been increasingly located in organs. This shift from function to organ, i.e. from process to structure, can be explained through the influence of western medicine on these Asian systems.
16. Another pharmaceutical company markets the product *Brento* as 'A boon for every student' which 'sharpens the memory' and 'improves learning and grasping ability'.

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Yet another product (in command of stress) is especially designed for combating stress of urban professionals, is marketed by one of the biggest Indian companies producing Indian indigenous pharmaceuticals. An assistant marketing manager who is also closely involved in research and marketing of this product explained the mechanisms of action of this product on as follows:

> "After twelve o'clock in the morning the hormonal balance gets disturbed which leads to a shortage in the production of enzymes for digestion. If digestion becomes weak shortage of energy as well as accumulation of acid in the muscles will be the result. Because of weak digestion not enough antigens and antibodies are produced. This will undermine the adaptogenic potential of the body. By taking one capsule of this product in the morning the hormonal balance is maintained, digestion remains optimal and one can adapt to the demands of modern life. For example, when a manager comes home after a strenuous day, it gives him the energy to assist his daughter in the preparation for her examinations."

Once again, the mechanisms of action are described along modern lines. Hormones, enzymes, antigens and anti-bodies dominate the discourse. But in spite of these modern terms, this product is an Ayurvedic medicine in the traditional sense. This becomes obvious when we look at what Indian authorities have to say on the sole ingredient of this product, based on the Indian plant drug *Aśvagandha* which is aphrodisiac and strength-giving (Nadkarni 1954, p. 1292). *Aśvagandha* 'makes a man as potent as a horse' (Sharma 1933, p. 33). Like in the discourse on semen loss which was discussed before, digestion, vitality and virility are once again linked up. The product does not present a rupture with the past. Because it aims at revitalizing the body by enhancing tissue building and detoxification, one could agree that this product is still an Indian medicine.

Because the treatment of mental dysfunctions is somato-psychic, Ayurvedic psychopharmaceuticals do not differ from medicines aimed at somatic complaints. This can be demonstrated by looking at an anti-diabetic drug which consists of 75% of *Aśvagandha*. This *rasāyana* was recently developed by a medium-sized South-Indian Ayurvedic company and is marketed as an anabolic and aphrodisiac to increase 'fresh energy and vigour in a system worn out'. Leakage of semen leading to the loss of vitality becomes the leakage of *kapha*, i.e. the sweet liquid and sticky *doṣa* which is associated with semen. A traditionally trained *vaidya* who runs the Ayurvedic college which is established by this Company, explains it thus:

> 'In diabetes *kapha*, the mucous which gives the body its cohesion and vigour, melts. We should picture the body of a diabetic patient as a snow-capped mountain on which snow is melting due to the summer season. Diabetes is marked by excessive

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The severe competition among students in India is common knowledge. An article with the title 'Competition Trauma' (*India Today*, 29 September, 1997) speaks of suicide among students during the grade XII examination and the entrance examinations that follow. In 1997 Delhi University had only 37,000 places for 900,000 students seeking admission.

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loss of sweet urine which means that *kapha* leaves the body during urination. That is why polyuria is such a prominent symptom in diabetes.'

Treatment of somatic diseases and mental dysfunctions aim at the building of 'vital body constituents'. Therefore, digestion, vitality and virility are central to all treatments. Unlike in western medicine, psyche and soma are made of the same substance. Both are material. The approach of Ayurveda is somato-psychic. Physical and mental health depend upon the production of the final essences, *śukra* (reproductive essence) and *ojas* (vital essence of *dhātus*). This brings us back to the 'economy of semen' with its moral overtones.

Cultural notions: biomorals and digestive problems

Imagine a big intersection in the southern Indian city of Bangalore which is a rapidly expanding city famous for its high-tech industry. On this crossing is a big pharmacy where an Ayurvedic physician prescribes and dispenses Ayurvedic pharmaceuticals. The pharmacy is packed with modern-looking, middle class customers. In between diagnosing his patients and giving medical advice on the phone to Indians overseas, the *vaidya* comments on the articulation of modernity and traditional Indian values:

> 'My patients prefer pills for a quick fix because it is comparable with their modern lifestyle. But if this medication does not work at short notice they expect me to give them spiritual guidance and to couch their symptoms with morality. Though they might be modern in many respects, like all Indians, they are easily tingled with spirituality.'

In two recent articles, the American anthropologist, Alter, typifies Indian discourses on health and the body as an ethical endeavour. He discusses the articulation of personal body hygiene and improvement of public health in the writings of Mahatma Gandhi. Alter quotes Gandhi's words: "Morals are closely linked with health. A perfectly moral person alone can achieve perfect health" (1996: 301-302). In an earlier article, Alter has discussed physio-moral bodies of North Indian wrestlers as a medium for "the wrestler's critique of national politics" (1995: 109). Indeed, in India it is current to link biomorals, disease and corrupt politics.

Ethics are also strongly connected with the theory of the three humours (*doṣas*) which is central to Ayurveda. Disease is caused by disbalanced humours which become the 'faults' (*doṣa*) of the body (cf. Obeyesekere, 1977). Sometimes there are even explicit religious overtones, like in the commentary of a traditionally educated *vaidya*:

> '*Doṣa* is a fault in this life-time or in the life before. It is conveyed to us in the womb of our mother. So disorder is already in us before we are born. When we fall ill, the pace of normal disintegration is accelerated. Ayurvedic medicine tries to lead the body of the patient back to its normal pace of disintegration. Nowadays people are ruled by greed and competition, therefore the body disintegrates at a faster pace. In the age of Vedas people became much older because they lived in harmony with each other and nature.'

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In contrast with allopathy, Ayurveda does not consider disease to be a part of nature (*prakṛti*). Sick people are in a state of *vikṛti* which means 'distortion', 'defect', 'mutilation', or 'impairment' (McGregor's *Oxford Hindi-English Dictionary*, 1993). Treatment is aimed at bringing the patient back to nature which is actually the humoural balance typical for an individual, that is his personal *prakṛti*. Indeed, illness is not an aspect of nature but a sign of the violation of the rules of nature.[17] Within this framework, illness eventually is a perversion.

Moral overtones in Indian discourses on illness are not a thing of the past. In 1996 the Vice-President of a Bombay-based herbal company who a few years back started the production of Ayurvedic medicines, confirmed this by saying:

> 'The further people are removed from nature, the quicker they will become ill. Nowadays, people go in for general enjoyment and indulge in food and drink. They are selfish and do not follow the rules concerning diet and behaviour. From this immoral conduct disease will automatically follow. People do not fall into disease, but invite it by disregarding nature.

Indian biomorals have a lot to do with hygienic practices, like diet and behavioral rules. Though lately in big Indian cities the content of these practices might have been changed through influences of the New Age movement from the United States and Europe, the clothing of illness with morality definitely has its roots in Indian culture. Digestion is a second Indian notion which shapes the Indian illness experience. The large number of Ayurvedic digestives which are marketed in India as well as the importance attached in India to proper defecation, point to this direction. In the discourse on digestives, vitality and morality, two crucial Ayurvedic themes, become tied up. The next quotation from a research report on the digestive *Abhiyasan*, produced and marketed by a pharmaceutical firm, is a case in point:

> 'The food which is considered to be the nourishing factor of body elements, vital essence, vitality, complexion of things, is dependant for its nutrient action on the gastric fire. If this is vitiated, it does not digest even the lightest of food and that food which is undigested acts like poison and the body elements cannot be formed.... The developing trend of the violation of code and conduct and wrong living gives rise to indigestion which affects the normal routine' (Thakur, Bhatt, Mishra, et al., 1995, p. 23).'

Cultural concepts

Ayurvedic medicines embody Indian cultural concepts like *ahimsā* (non-violence) and *prakṛti* (nature, personal constitution). They are seen as natural, non-toxic medicines

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17. Equating 'balance' with a personal humoural equilibrium is not unique to Ayurveda. Within Islamic medicine the word *ta'biat* is used while in ancient Greece the concept *physis* was used in the same sense (cf. Azmi, 1995).

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which restore the personal balance of a patient. They must take away the root cause of the disease while allopathic medicines 'sweep the dust under the carpet', as the assistant of the main physician of a well known pharmacy, conveyed to me. Nowadays recovering the personal constitution (prakṛti) of a patient is seen as improving immunity against disease. On this topic an advertisement for Chyawanprash, aimed at middle class housewives, says:

> 'Toughens You Up From Deep Within
> Power of Immunity. Immunity...the strength to fight disease, from within. Drugs and antibiotics leave you weak, reducing your resistance to germs and infections. Only a strong immunity can help you rise and shine above the daily chores of family life. The Unique Immunity Builder. Research proves that Chyawanprash fortifies your immune system. Building up resistance. Giving you the strength to fight allergies and infections. From within' (*Women's Era*, January 1, 1998).

Ayurvedic medicines claim to be wholistic in the sense that there is a slogan of a pharmaceutical company 'Ayurveda ensures complete physical, mental, social and spiritual health'.

Ayurvedic therapeutic drugs, besides being marketed as natural products which neutralise the toxic side-effects of synthetic drugs or hasten recovery after surgery or radiation therapy, are sometimes also projected as non-violent alternatives for allopathic surgery. Some drugs now being marketed as the effective ones for the removal of bladder and kidney stones, are examples of such medicines. However, the absence of side-effects—a contemporary medical 'interpretation' of the Indian concept of *ahimsā*—is the foremost attraction which Ayurvedic pharmaceuticals hold for Indian consumers. A druggist in a middle class area in North Delhi, opines:

> 'If I recommend an Ayurvedic medicine, my customers will easily comply. They are convinced that Ayurvedic products are without side-effects. But when I suggest them to buy an allopathic drug they immediately start to worry about side-effects and often tell me they want to consult their doctor first about the toxic effects this medicine might have on their bodies.'

Because Indian cultural values are considered to reflect the laws of nature which once upon a time were revealed to humanity, Indian culture encloses nature. (Ramanujan 1990: 50). Ayurvedic concepts and views are based on the observation of nature as one informant stated:

> 'In the time of the Vedas many sages were living in the Himalayas. They gained knowledge by observing nature. The rishis noted that monkeys regained their strength and sexual powers after eating a special kind of rock. The sages were able to lengthen their lifespan considerably by immitating these monkeys. In Ayurveda this rock is known as shilajit which is used to promote vitality and vigour.'

Though the presentation of cultural axioms as natural laws is a well-known strategy for convincing others, this manager's vision makes sense. Ayurvedic concepts are evidently

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phenomenological and many of its principles refer to natural processes. The six *rasas* (tastes) and the *guṇas* (qualities) which categorize the Indian materia medica, are a case in point. The movement of humours 'against the tide' as an important etiological factor (Cf. Tabor, 1981; Obeyesekere, 1992; Bode, 1995), as well as the ascription of skin discolorations to the humour, *pitta* (fire), are two examples of the prominence of the principles of nature within Ayurveda (Cf. Zimmermann, 1987).'

Ayurvedic concepts are comprehensive cultural concepts (Zimmermann, 1987; Ramanujan 1990, p. 52). They are clothed with morality and meaning. As noted before, within Ayurveda, disease is seen as a disruption of a natural balance. Their closeness to bodily experiences as well as their ethical overtones make Ayurvedic concepts suitable for 'enacting, reconciling and undoing conflicts' (Leslie, 1992). An important mechanism of the action of Ayurvedic therapeutic drugs merits some consideration.

Symbolic efficacy[18]

Medical practice and laboratory medicines are two different domains with a validity of their own. Efficacy in controlled drug trials differs from that in medical practice (Young, 1981). In the laboratory the human body is pictured as an object belonging to a class of interchangeable body-objects. Clever research designs are developed which filter out idiosyncracies of individual patients. These could jeopardize the range of the research findings. However, for physicians and their patients it is often crucial to judge the illness within the living body of a patient. Idiosyncracies become important and a patient is often better pictured as a subject for whom suffering is saturated with meaning. In good medical practice the interaction between body and mind becomes a reality rendering the

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18. The plea for acknowledging symbolic factors in the evaluation of Indian indigenous pharmaceuticals does not imply that these products have no specific pharmacological effects. They certainly have as indicated by a substantial number of toxicity and effectivity studies. These effects might be partly explained by immuno-modulating activities of Indian therapeutic drugs (cf. Labadie and De Silva, 1987; Kroes et al., 1992).

    Improvement of the health of patients can be ascribed to (i) specific effects, e.g. the chemical and physical constituents of a drug under study, (ii) non-specific effects which can be labelled symbolic and include psychological and sociological phenomena, and (iii) natural remittance of the patient under study. Non-specific effects and natural remittance are usually considered as placebo-effects. Lately this placebo effect which was always depreciated as an interfering factor to be kept under control, is taken more seriously and seen as an important ingredient of the healing process. The importance of the placebo effect becomes obvious when we take into account that this effect is responsible for 15 to 60 percent of the healing potential of western pharmaceuticals (Brown, 1998).

    Many Ayurvedic and Unani medicines are marketed for fighting chronic diseases like arthritis, asthma and diabetes as well as for the treatment of functional complaints without a detectable somatic base. For these complaints symbolic mechanisms of action - together with the regulation of biological bodily processes - could be a trump card for the propagators of Indian medicine.

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mechanistic model of the body irrelevant. At this level, symbolic efficacy of medicines is not the placebo-effect, associated with dishonest practice, which has to be filtered out to judge the efficacy of the drug under study, but an important factor in the healing process.

Symbolic efficacy only makes sense when we picture the human body as a meaningful subject.[19] To elaborate on the relevance of the conception of the human body as a locus of meaning, one should turn to the French philosopher Merleau-Ponty (1962) who placed the body at the centre of his existential phenomenology. Emphasis is put on a 'lived-body' endowed with pre-theoretical intelligence. The world is experienced and judged in relation to the needs of the body. The surroundings are seen as an extension of the body in the sense that the body evaluates its environment in relation to its own possibilities. Merleau-Ponty considers the body-subject (*corps-sujet*) as a locus of meaning full of pre-conceptual knowledge and intentions. Being equipped with an intelligence of its own, the body does not react mechanically to the world, but moulds the surrounding world into a meaningful Gestalt. For example, if we want to lift an object and completely misjudge the weight, we experience physical and subsequently psychological disorientation. If this happens, the body has to readjust itself. Lifting cannot be performed automatically any more and for a moment reflective consciousness has to take over from the body-subject (cf. Van der Geest, 1995).

Merleau-Ponty's conceptualization of the body is more in tune with the realities of everyday life than the mechanistic view of laboratorium science. Traditionally, also within Ayurveda, adequate importance has been attached to the agency of the body. Two examples will be given to illustrate this point, but many more can be given to demonstrate the body's agency in relation to the environment. Let us consider the importance of food because of its importance within Ayurveda. Matter becomes food by the ability of the stomach to digest it and our blood and tissues to absorb it. In the dialogue between the body and natural substances, matter is transformed into food, and eventually food is transformed into the body-subject. This corresponds to the transformation of food into the seven Ayurvedic body constituents (*saptadhātu*).[20] A second example is the Ayurvedic concept of *prakṛti* which, besides referring to the personal constitution of patients, includes the self-healing capacity of the body. Nowadays this pre-conceptual intelligence of the body becomes more and more equated with its immuno-modulating capacity.

In the laboratory where bodies are objects, there is no room for animate bodies and symbolic efficacy. However, both are a reality in medical practice. Because Ayurvedic medicines embody Indian notions about health and disease such as digestion, biomorals and non-violence, these substances are effective in a symbolic sense.

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19. The author is obliged to Douwe Tiemersma for his valuable suggestions on Merleau-Ponty and vitalism.
20. Within contemporary Ayurvedic practice indigestible food juice (*āma*), which indicates the failure of the body to integrate food into its system, is perhaps the most important cause for disease (cf. Tabor, 1981).

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Detoxifying the venom of modernisation

Metonymically Ayurvedic pharmaceuticals refer to the glorious age of the Vedas when people adhered to the rules for diet and social conduct. The Vedic period is typified by the absence of disorder and corruption and the omnipresence of peace and purity. Being symbolically linked to this period will generate hope and confidence. This will empower people to deal with the strains of life in a competitive and corrupt world.[21]

Besides offering strength and trust, Ayurvedic pharmaceuticals offer psychological handles to fight disease. After all, they embody Indian notions and concepts which make them 'good to think with' (Lévi-Strauss, 1962). Ayurvedic therapeutic drugs offer patients the tools to get a grip on their illness by providing an idiom to express their complaints and to negotiate a solution.[22] They provide patients and their relatives the means to integrate illness in their daily existence. (consult van der Geest & Whyte 1989 for a discussion on increasing the tangibility of the illness experience through the consumption of medicines).

Therefore, the prescription and consumption of Ayurvedic medicines offer a strategy to deal with disease. Stress, general weakness, cognitive and sexual dysfunctions as well as skin diseases, respiratory problems and joint pains, are all disorders for which Ayurvedic pharmaceuticals offer tangible solutions. Besides drawing on traditional Indian notions

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21. Besides providing strength, Ayurvedic pharmaceuticals have the potential to anchor urban professionals more securely in the middle classes. The symbolic manipulation of bodily borders could very well provide a sense of security. Control over somatic borders through the use of Ayurvedic medicines could diminish worries in relation to class membership. After all, if people are unable to influence things in a direct way there exists the possibility of symbolic manipulation. For instance, when illness is expressed in an idiom of pollution, symbolic manipulation of impurities could offer psychological relief. Indeed, symbolic manipulation of concerns which cannot be alleviated directly, is an effective psychological strategy (cf. Fernandez, 1986; Bode, 1994).
Ayurvedic medicines have a lot to do with bodily borders. Digestives are used to transform food into bodily tissues, while other medicines expel toxics (*ama*) from the body. Ayurvedic medicines can be pictured as somatic sentries. Being strongly involved with somatic borders, Ayurvedic medicines offer a metaphor for unconsciously controlling social cadres. In this way the consumption of Ayurvedic medicines could very well diminish fear for social downfall. (consult Douglas, 1966, pp. 124, 126 for a discourse on somatic borders symbolising social boundaries. Cf. Ohnuki-Tierney, 1984, p. 164 and Mullings, 1984.)
However, this could not be confirmed in conversations with consumers of Ayurvedic pharmaceuticals. Indian informants pointed out that Indians have better means to anchor themselves in the middle class. Cultivating networks of relatives and friends, investing in the education of children as well as the acquisition of property like farmland and houses, were put forward as better means for enhancing social security, perhaps a right approach.
Besides, it would take intensive in-depth interviews to get at the tacit levels of the consciousness where symbolic manipulation of social boundries might be a psychological reality.
22. Nichter (1982) describes a treatment by a traditional *vaidya* of a young woman who suffers from general weakness, depression and whitish discharge. By using the Ayurvedic idiom a solution is negotiated between the patient, her parents and the *vaidya*. Besides medication, the treatment consists of offering the woman the prospect of advancing her own interests.

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they also embody modernity. After all, these substances share in the prestige of western science by the usage of modern production and research technology.

Ayurvedic products represent the best of both worlds. Like many Indian urban professionals they are modern and traditional at the same time. They offer to urban professionals of Indian society an antidote against the somatic and mental toxics which invade them. Their lives are either marked or marred by polluted air and water, consumption of fast food, alcohol and synthetic medicines as well as by fear and stress due to severe competition.

Postscript

Indigenous medicines have always been a part of Indian culture. Formerly they were produced on a small scale by local *vaidyas* and *hakims*. Besides being part of local folk traditions, these medicines belonged to what Leslie (1976) typifies as traditional culture medicine. Recipe-books (*nighaṇṭus*), secret family formulae, religious overtones, and the mingling of ideas and practices of Ayurvedic, Unani and folk origin, all typifying traditional culture medicine.

In the nineteenth century Indian medicine began to change. Professionalisation, institutionalisation and industrial production of indigenous medicines were increasingly shaping Indian medicine. In line with the Bengali Renaissance revivalists made efforts to bring Indian medicine in line with modernity (Leslie, 1976, 1992). The renewed interest in Ayurveda and Unani was both idealistic and pragmatic. Research on Indian drugs had to make India less dependant on pharmaceutical imports from England (Ainsly, 1813; Dutt, 1900; Chopra, 1958; Bala, 1991), while the Independence movement propagated the consumption of Indian products together with a critical revival of Indian knowledge systems to foster national pride and self-rule. There are many examples of this kind of nationalistic revivalists (Leslie, 1992; Kumar, 1996). For instance, Hakim Ajmal Khan propagated researching 'the old storehouse of Indian medicine' through modern sciences like chemistry, physics and biology, while doctors like S.K. Burman and P.S. Warrier, introduced modern production techniques 'to make cheap Indian medicines available for the masses'.

In the 1970s and 1980s there was a turn of the tide. The rhetoric of *Svadeshi* had run out and the commodification of Indian medicine was increasing. Leading producers of Indian medicines shifted the sales of their products from their company-clinics to large scale distributors who served their own networks of druggists. Marketing through advertisements in magazines and on television, increasingly replaced the profile of companies through the establishment of medical colleges, company hospitals and by financing translations of classical medical texts. Positivistic pharmacological research and much less 'the old age truths of the classical texts' was now used for the legitimation of Indian medicines. After the liberalization of Indian economy at the end of the 1980s and the beginning of the 1990s the commodification of Indian medicine accelerated. Large companies of Indian pharmaceuticals went for a notation on the stock exchange. At present pragmatics prevail. The same holds true for consumers of Indian indigenous

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pharmaceuticals. Indian medicines are nowadays mainly consumed because they are considered safe and natural as well as in line with personal constitutions and seasonal idiosyncracies.

Symbolically Indian medicines are contrasted with western therapeutic drugs that are pictured as synthetic and aggressive drugs with iatrogenic consequences. To create a non-violent image, aggressive therapies which once were part of the Indian medical tradition, have been purged from its contemporary practice (Zimmermann, 1995). Besides developing in contrast with western medicine, Indian medicine has also developed in line with this system. Reinterpreting Ayurvedic concepts along modern lines, the importance attached to the categories of allopathy and its diagnostics, as well as the dominance of positivistic research, are cases in point. Nowadays, the object of treatment is not a fluid, hydraulic person consisting of different sheaths but the western anatomical concept of the solid body (Zimmermann, 1995, p. 212). Such a reinterpretation of Indian medical concepts should not surprise us if we realise that medical practices reflect social and political realities (Van der Veen, 1984; Unschuld 1992). Indeed, Indian society has changed tremendously since the time in which the main classics of Indian medicine have been written. A hydraulic body which is constantly in interaction with its environment, reflects a society of farmers and not the everyday realities of western educated Indians in contemporary metropolis.

The use of modern sciences like physics, chemistry and statistics are not the exclusive right of the producers of western medicines. Their application to research on Indian medicines is not a recent phenomenon. The rising popularity of Ayurvedic medicines among Indians with a modern education like urban professionals and allopathic doctors as well as the increasing necessity of adhering to international standards, have made pharmacological research along positivistic lines even more important. However, idiosyncrasies of Indian medicines establish hurdles for positivistic research. The large number of chemical constituents make adherence to positivistic research designs troublesome while standardisation is hampered because natural products are never identical. Not only these technical constraints are reasons for concern but also the enormous financial investments which go along with contemporary pharmacological research. It seems wise not merely to focus on positivistic research. To take into account the total drug effect, will be an option. Alongside their biological efficacy, Ayurvedic medicines embody symbolic efficacy that works through cultural notions as well as phenomenological concepts. Fifty years after independence the time has come for a more autonomous development of Indian medicine. This development should not be complementary and defensive towards the 'intimate enemy' (Nandy, 1983) in its guise of western science and medicine. When approached creatively and respectfully, Indian medicine will have a lot to offer to India and the world.

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CHAPTER 18

The Interaction of Indian Medicine* and Modern Medicine (Colonial Period)

Tom Patterson

Apart from a few isolated travellers and missionaries, the first direct contact of Indian medicine with modern (western) medicine ensued with the arrival of the Portuguese traders at the beginning of the sixteenth century, followed by the Dutch(1596), the English (1608), and the French (mid-seventeenth century). These trading companies brought surgeons with them,who had expertise in the then current clinical practices in Europe. The early traders,weakened by the long sea-voyage and in the tropical climate, suffered a high incidence of disease, with a continuing mortality among their relatively small numbers. Their surgeons had little or no knowledge of tropical diseases from which they suffered from time to time, and their drugs and methods of treatment either were often useless or actually harmful. Naturally, therefore, in the beginning they sought any medical help that was available from the local practitioners.

In the early seventeenth century, the English defeated the Portuguese at sea, and began to build up their power on land. The surgeons, with the contemporary advances in European medicine and their increasing knowledge of tropical diseases, in course of time, became less dependent on Indian medicine. From the 1740s the English (British by the Act of Union 1707) were in conflict with the French for mastery on land. Both sides established regular armies into which Indians were also recruited. Alongside, medical services too began to be organised. The formal organization of the British medical services at this time become the forerunner of the Indian Medical Service which continued until 1947. The French were finally defeated in 1762, and the British East India Company became the most powerful Company in the East. However, its surgeons, better trained than their predecessors, became increasingly critical of what they regarded as the

*Indian medicine today is made up of Ayurveda (including *Rasaśāstra* and *siddha*), Unani, Homoeopathy, Naturopathy and Yoga.

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conservatism of Indian medicine. Towards the end of the eighteenth century, the changes that brought about the 'Enlightenment' in Europe began to have their impact on India. More importantly, some of the British administrators evinced keen interest in India history, culture, astronomy, mathematics and medicine.

By the early nineteenth century the East India Company had become the effective government of British India. The policy of 'westernization' was introduced and in 1835 English became the medium of instruction in the colleges. At the same time all support for Indian medicine was withdrawn, and its teaching was confined within the traditional families. On the other hand, some medical schools were set up in different parts of the country on western lines, but the teaching of medical subjects was in English.

In 1857 the political power of the Company was transferred to the Crown through 'An act for the better government of India'. Three universities were founded in the same year at Calcutta Bombay, and Madras, and the teaching of science in English was gradually strengthened. The practitioners of Indian medicine continued in their classical tradition, and there was no appreciable interaction with western medicine among both the colonial administration and the natives. But, since Independence (1947) Central and State Governments have been promoting Indian medicine in parallel with modern medicine, and there is now some integration of the two systems.

INDIAN MEDICINE UP TO THE SIXTEENTH CENTURY

Ayurveda had been systematized, perhaps from c. 500 BC., though the classical texts, the *Caraka Saṃhitā* and the *Suśruta Saṃhitā,* appeared in the early centuries of the Christian era. Between the seventh and twelfth century there were other important Ayurvedic texts. There was also the advent of Unani in India, perhaps in the twelfth century. The Ayurveda had already co-existed with Unani since the thirteenth century and these two systems had their own pattern of interaction. Unani is Galen's system of humoural pathology, taken over from Greek medicine in the early Islamic period. Ayurveda and Greek medicine have some similarities, although the relation between them is debatable. The European translators of Sanskrit manuscripts at the end of the eighteenth century assumed that all Indian ideas must have come from the Greeks. But Filliozat has suggested that there were early exchanges of learning between Greece and India with Persia as the intermediary, and that the two medical systems probably developed in parallel.

Ayurvedic remedies are predominantly herbal, while Unani practitioners use more of metal compounds and minerals in addition to plant products therapeutically. But, by the sixteenth century, the two systems had existed side-by-side long enough leading to a considerable interchange of pharmacopoeias. In the medieval period, Ayurvedic classical texts were still the authorities for medical practice, and the contemporary medical writings were mostly commentaries on them, which did not add much to their general principles. The Islamic rulers in India endowed well-organized hospitals in the main cities, with free treatment for the people. A notable feature was that Muslim (Hakims) and Hindu practitioners (Vaidyas) were appointed and they worked side by side in these hospitals. In much earlier times, surgical technique in Ayurveda had reached a very high standard,

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as described in the writings of Suśruta. But this had steadily declined in the medieval period. By the sixteenth century there was very little operative surgery, although the actual cautery was used universally, both for humans and animals.

Buddhism had expanded rapidly form the middle of the third century B.C., and Buddhists encouraged the study of medicine, the monks carrying this knowledge with them on their missionary travels. There was exchange of information with China, and the Chinese came to India to study Buddhism. But the medical systems of the two countries remained separate. Very little Chinese medicine seems to have come back to India. For example, acupuncture never became part of Indian medicine, and there is no mention of it in the classical texts. Its earliest use in India seems to have been in 1930 by F. H. Brett, an East India Company surgeon, who also reported cases of rheumatic conditions outside India.

In parallel with classical Indian medicine, and overlapping it at many points, was the folk medicine which had existed since Vedic times. As in Europe, folk practitioners always greatly outnumbered the classical practitioners and they were responsible for the treatment in their own way of the greater part of the population especially in rural areas, by and large as a faith cure . The similarities of folk and classical medicine in India meant that the two were often confused by the early traders. The obviously superstitious basis of folk medicine with its lack of a written tradition, was to lead to a commonly held opinion among Europeans, towards the end of the seventeenth century, that all Indian medicine was quackery.

Alchemy (*Rasaśāstra*) had been part of Indian medicine from the earliest times. Ayurveda was primarily concerned with virility and longevity, but by using herbal elixirs for these purposes. With the rise of *Tāntrism* in the fourth-sixth centuries, metalllic preparations particularly of mercury, were used in the search for immortality.*

There were many advances in the knowledge of different metals, minerals and their compounds, specially of mercury, sulphur and mica. From the eleventh century this expertise was turned towards the preparation of medicines which were used in parallel with Ayurveda and Unani, and such medicines developed mainly in the Siddha system in Tamil areas. Metals and minerals were subjected to complicated treatments with medicinal plants to make them suitable for internal use. Paracelsus, in the sixteenth century, used a mixture of salt with mercury and sulphur, and recognised that this knowledge of alchemy should gradually develop itself into the science of chemistry, but this change did not occur in India where the secret work or esoteric of the alchemists continued.

Interaction before the sixteenth century

From the seventh century, there had been a considerable interchange of medical and scientific information between Indians and Arab traders. Arab medical practitioners of the

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*The use of mercury and its compounds was transmitted by Buddhists monks and traders as well as travellers from China, where cinnabar (mercuric sulphide) was an important elixir of immortality (Dr. B.V. Subbarayappa, personal Communication).

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tenth and eleventh centuries, such as Rhazes and Ibn Sina (Avicenna), had a considerable knowledge of Ayurveda which they incorporated into their writings. Translations of these into Latin in the thirteenth century,which were transmitted through Spain, became the standard medical texts in Europe in the Middle Ages. In this way, some Indian medical knowledge reached the West. But much of it remained unknown in Europe until the end of the eighteenth century, when the first translations of Ayurvedic works from Sanskrit into European languages were made.

The European trading companies were set up from the sixteenth century to capture a share of the lucrative spice-trade. It may be noted that there had been a demand in Europe for spices form the East since early Roman times. The cargoes of spices had always included medicinal drugs. Galen, in Rome, A.D. 180 prescribed drugs from India and nearly all the spices were used medicinally at various times. With the spices came the news of preciously unknown plants that were reputed to have medicinal properties, and this aroused great interest in the possibility of new remedies. Asian plants were cultivated in Europe in the sixteenth century, and eastern drugs were held in great esteem.

Comparison of Indian and European medicine in the sixteenth century

Until the mid-seventeenth century, when the pattern of European medicine began to change, European and Indian medicine had many features in common. European medicine was based on the Greek or Greco- Roman 'humoural' philosophy, viz. health depends on a balance of humours in the body, and disease is a result of imbalance among the humours. Such a concept in a somewhat different way was also conceived in Ayurveda and Unani. Ayurveda had three humours, European and Unani, have the four derived from Greek medicine. All the three systems are allopathic in as much as disease is to be treated by drugs which are equal in strength but opposite in quality, to restore the balance of humours. Homoeopathy—'like cures like'—(founded by Samuel Hahnemann in Leipzig in the late eighteenth century) was not introduced into India until c.1830. Unani and European medicine followed Galen's practice, which had undergone little change since the second century. The surgeons of the early trading companies brought with them conventional Galenic principles of pathology and treatment. When they learned of the Hindu doctrine of transmigration of souls, they considered this to be Pythagorean, although the connection of Pythagoras with India has not been established. Treatment in both Indian and European medicine, was mainly directed to the relief of symptoms, and remedies were compounded of multiple ingredients, mostly herbal. The importance of diet was stressed; likewise the need for a healthy regimen to ward off diseases and promote long life. Examination of the pulse was essential for diagnosis and prognosis. The earlier expertise of Indian surgeons had, however, receded into oblivion long before the sixteenth century. The European trader's medical officers were primarily trained as surgeons, and their services were soon in demand in India.

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The Portuguese in the sixteenth century

By 1510, the Portuguese were firmly established in some parts of the west coast of India, with their capital at Goa. Their most distinguished physician in India in the sixteenth century was Garcia da Orta who lived and worked in Goa (1538-68). Earlier travellers' accounts had sometimes included scattered medical details, but da Orta wrote the first specific book on medicine in India. He had a busy medical practice in Goa and not only the Portuguese but also many of the local rulers and noblemen were among his patients. When called into consultation with the local physicians, he always tried to learn from them. Although he was critical of their knowledge of anatomy, not only did he accept that the native physicians gave satisfactory remedies to relieve suffering but also acknowledge, how much he had learned from them. da Orta made an extensive study of the local plants and drugs, and compared the methods of treatment of the Indian physicians with European methods as well as even with those of the classical Arab authors. Many of the drugs and simples were already familiar, and there was clearly a good deal of exchange of medical ideas. The result was that the Portuguese doctors and druggists copied some of the Indian prescriptions, and the Indians began to learn the use of European medicines.

da Orta found that some of the local diseases were familiar. But he noted that cholera was much more virulent in India than in Europe, and gave a classic description of the epidemic in Goa in 1543. He did not agree with the then prevalent Indian treatment of this contagious disease with rice-water only by mouth, but he copied the local method of cauterizing the soles of the feet. During the cholera epidemic, the Governor of Goa once called a meeting of all physicians, both Portuguese and Indian, to determine preventive measures for combating contagious diseases and this also led to an exchange of medical practices among them.

The Indian doctors were credited with many cures, using their traditional remedies. They had acquired great prestige, and were granted special privileges by the Portuguese Government. Since Portuguese physicians were scared in Goa, it was not unoften that the Portuguese turned to the local practitioners, preferring them to their own countrymen because of the Indians' greater knowledge of local diseases. The first hospital for Europeans in India was built to accommodate about 1,500 patients by the Portuguese in Goa and this was run by Jesuits, with day-to-day care by Indians or Indian-Christians. The common diseases were cholera, fevers, bloody fluxes and particularly venereal diseases. There was also high mortality among the in-patients.

THE ENGLISH (BRITISH FROM 1707) IN THE SEVENTEENTH CENTURY

The first two English expeditions which left London in 1601 and 1604, headed for the East Indies, where they came into stiff competition with the Dutch who had established there since 1596. The third expedition sailed in 1607, and one ship sailed for India to found the first English factory in India at Surat in 1608. On subsequent expeditions the English were driven out of the East Indies by the Dutch, but by defeating the Portuguese in a series of seabattles, they were able to concentrate their activity on the Indian mainland.

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After the long sea voyage, the crew reaching India were often afflicted with scurvy, which, in turn, predisposed English immigrants to other diseases, particularly dysentery. There was also a shortage of English surgeons (who had as high a death rate as their patients) as well as of Europeans and stores which were damaged or destroyed at sea. Even if the drugs sent out from London arrived unspoilt, they were often found to be unsuitable. Faced with a continuing high mortality among their relatively small numbers, the English of necessity sought any type of medical help that was available from the local practitioners. The shortage of surgeons led to the employment of some Indians whenever necessary and this became an official policy of the East India Company in the first half of the seventeenth century. The British had come to realise that each oriental country was associated a benevolent deity, with the herbs and drugs necessary to treat the diseases of that country. It became, therefore, the Company's policy that the Indian diseases were best treated by Indian methods. It is interesting to note that the budget of the Company from the beginning included always an allowance for 'country' medicines.

The English had no experience of loving and working in tropical conditions. At first they brought their European habits with them, and continued to wear heavy uniforms and ceremonial dress, insisted on eating huge meals of animal protein,and drank alcohol in even larger quantities than at home. Their surgeons persisted with their familiar 'heroic' treatments including vigorous purging, blood-letting and large doses of mercurial drugs.

Learning from Indians

The English were impressed by the good health of Indian children, although they were often running naked, and how well the lightly-clad abstemious Indians tolerated the fierce climate. The foreigners soon learnt the Indian practice of abstinence particularly from meat which was regarded as a positive factor in avoiding and treating illness. Gradually they adopted some of the local customs, even though the European pattern of child-rearing was too well established to allow much change, and the increasing numbers of the English children who were born in India towards the end of the seventeenth century were generally sickly with a high mortality. Independent travellers and merchants who were on their own business often adopted the local dress, although many of the Company's merchants and soldiers refused to alter their clothing to match the climate, and suffered severely from heatstroke as a result. When it was recognised that huge meals and a high alcohol intake increased the likelihood of illness, some senior Company officials began to recommend temperance as a way of keeping healthy, especially in the hot season.

Confined to their 'factories' in coastal areas, the English mostly encountered Indian practitioners of folk medicine, and they did not distinguish them from those who had been traditionally trained in the classical Ayurvedic system. They, however, set out to learn as much as they could about local drugs. The surgeons studied the local plants for their medicinal properties, and began to include them in their prescriptions. As a result, the Company encouraged an interest in botany in its servants, and this was, at first, purely for medicinal use. Later there were systematic searches and investigations of local flora for possible commercial and industrial applications.

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In the meantime, the surgeons had learnt from the local physicians that temperance and fasting were the most important aspects of all systems of treatment. For the commonest diseases like fluxes and fevers, the recognised remedy was 'abstinence'; this principle was followed by the British particularly in the management of fevers. But they still found it hard to give up some of the dangers of vigorous blood-letting in the tropics, and realise that mercurial medicines should be used with great care. Individual travellers and Company servants working in isolated posts were dependent on the available native doctors when no other medical help was easily available to them. It would appear that they were appreciative of the benefits they received from the native doctors.

Comparison of medical practice in the seventeenth century

Indian physicians treated fevers by strictly limiting the diet, giving the patients only water to drink, rice gruel for sustenance, and forbidding meat and eggs. This dietary regimen was commended as being similar to the classical Gallenic regimen. Quinine, which had reached Europe from Peru in the form of 'bark' in the early seventeenth century, was used in India whenever it was available. But there was continued confusion over its efficacy as there was then no distinction between the various types of fever (malaria was not recognised separately from other fevers until the late nineteenth century). Indian remedies were used in its place, and reported to be as effective.

The English thought that smallpox should be less serious than in Europe, because the climate would keep the pores open and help expel the poison. But they found that it was worse because of the European practice of letting blood and giving enemas before the eruption occurred. But this practice was not generally adopted.

Plague which was spreading from China, had reached England in the fourteenth century. There were recurrent epidemics, but with lessening intensity until the last one which occurred in 1665. The first account of plague in India seems to have been given by Jahangir in 1616, and from then on it was endemic and this disease carried a very high mortality in India. In 1616, in Agra, as many as 1000 deaths were reported daily in the worst months from October of that year. Seven of a small British party died in nine days including a surgeon. Generally Indians were affected by plague more than Europeans. The Indians thought that God must be among the English, because fewer of them were affected. Even though their servants (Indians) died, some of the British thought that is was at least partly the meat and wine on which they fed which kept them rather away from this dreaded disease.

Cholera had been described by da Orta in the sixteenth century, but it was well-known in India long before that. Religious festivals along the upper Ganges were often followed by epidemic cholera among the pilgrims who spread it widely as they returned home. The English recommended bleeding while Indians used very large doses of opium; but this was dangerous to Europeans since they were not addicted to it. But Europeans who had cholera-attack were always more difficult to cure than Indians because of their indulgence in wines and spirits. For them, red-hot cautery was frequently applied to the soles of the feet and the belly.

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At that time no clear distinction was made between 'true' cholera and all the other causes of diarrhoea and vomiting. There was also no differentiation between the bacterial and amoebic forms of dysentery. From the earliest times it was recognised that hepatitis could occur with all forms of bowel disturbance and that, in the terminal stages, the liver might be destroyed by abscesses. The introduction of ipecacuanha from Europe, and its reported success in cases of dysentery made it likely that many of these were amoebic in origin.

Venereal diseases were already widespread in Europe where syphilis had reached its maximum virulence in the early sixteenth century. In India it was referred to as 'the European disease' as stated in *Bhāvaprakāśa* of Bhāvamiśra . The Portuguese, in particular, were regarded as the source of this disease. The standard treatment in Europe then was by bleeding, purging and sweating, with injections of mercurial drugs. The efficacy of mercurials was well known, and their abuse was soon widespread. The recognition of its toxic effects led to a search for other remedies, such as China Root which was widely used in India, and cobacini (*sarasaparilla)*, which had been imported from China.

The early European traders often remarked on the expertise of Indians in the treatment of snakebite. At first they followed them in their dread of snakes in general and in the belief that all snakes were poisonous. But as the English gradually learned more about the natural history of snakes of India, they began to differentiate between the poisonous and the harmless, the latter being in much greater number. The English became increasingly sceptical of the harmful effects that were reported after many snake-bites, having come to recognise that many of the symptoms were only due to fear that a poisonous snake had bitten them. Increasing familiarity with the local cures also showed that, although there were many Indian remedies, their specificity was very doubtful in curing snake-bites.

The Portuguese, from their experience in Brazil, were already familiar with various types of worms and the diseases that they caused. Guinea worm was soon encountered by traders in the East, and they learned the cure from the victims who treated themselves by taking the worms out of their legs and winding round a twig, taking care to do this slowly. For, there was, however, a great danger if the worms broke in the process.

The first English hospitals

Nearly all the early travellers who reached India by sea landed in the area of Surat and Cambay where the Jain religion was generally predominant. The Jains had compassion for animals and set up hospitals for the cure of sick animals. When the British found that the hospitals were provided in the places where they landed, for animals of all sorts, but none for humans, they assumed that this pattern must have been in vogue over the whole of India.

The English with their small numbers which were continually depleted by a high incidence of disease, had no separate accommodation for their sick persons, who had to remain in their billets around the town, nursed by their Indian partners. Most of the diseases were infectious and, for their treatment, the first hospitals were set up as

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isolation buildings well away from the main centers of habitation, Fort St. George, Madras, in 1664; Bombay, in 1676; and Calcutta in 1707. But these hospitals were for Europeans only. At first, only the unmarried were to be admitted while the married were to be looked after at home by their wives or partners. The medical officers were given a yearly allowance of 50 pounds for European medicines, and the same amount for medicines procured locally. Indians were also employed but as dressers in these hospitals. However, unofficially the English surgeons trained them to carry out various medical tasks. Most of the nursing and hospital duties were carried out by Indians, and they were entrusted especially with the compounding of medicines, in which Indians became efficient soon. There were many testimonials by the surgeons eulogising the skill and care displayed by their Indian dressers. The privileged members of the Indian royal families would request the services of individual Company surgeons, but there was no formal treatment of Indian (common) people by the British at this time. Although the first Indian troops were recruited by the English in 1677, no special arrangements were made for their medical care.

Transition from the seventeenth to the eighteenth century

Towards the end of the seventeenth century the power of the Mughal Emperor had begun to wane, leading to the gradual disintegration of the Mughal Empire in the eighteenth century. As the British became more powerful they were less dependent on the goodwill of Indian rulers for trading concessions. The result was that they began to distance themselves from Indians as well as from Indian customs that they had in a way adopted in earlier times. Communication with the general public was also hindered because of the problems with language. It was exceptional for any trader to learn the vernaculars; all business was conducted in corrupt Portuguese or through interpreters.

In the meantime, advances in medicine in Europe were beginning to change the attitude of British surgeons towards Indian medicine. Throughout the seventeenth century, with the development of physics and to some extent chemistry, the classical humoural concept of disease was changing, at it was recognised that vital physiological phenomena, like the physical world, had mechanical explanations. At the same time, effective new drugs such as quinine (cinchona bark), ipecacuanha and antimony compounds were being introduced. With these advances and the increasing experience of tropical diseases, British surgeons became indifferent to the drugs of Indian practitioners, although they were using appropriate Indian medicaments on their own without any consultation with the native doctors. In addition, well-trained physicians were being recruited by the Company in England, thus bringing with them to India the latest medical doctrines and practices from Europe. These new scientific principles were regarded as superior to those of traditional Indian medical systems. In particular, anatomical research in Europe had established a firm basis for medical practice, and the newly-arrived British surgeons were increasingly scornful of the traditional concepts of Indian anatomy, which were not based on human dissections. This changing attitude led to the extolling of European ideas, and the corresponding denigration of Indian ideas, that was to characterise British thinking in India in the eighteenth century.

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The foremost Company physician in India at the end of the seventeenth century was John Fryer (1650-1733) who gave a detailed account of Indian medicine which he had learnt from local practitioners. He admitted that, through their long observations of the diseases of their country, the Indian physicians might have better success than foreign physicians. Although he found many things to commend in the Indian systems, he was critical of the native systems since they lacked formal training and a standardised practice in medical treatment. Nevertheless, a good deal of medical information was now coming back to Europe from European surgeons in India, which added new drugs to the European pharmacopoeias. This was helpful in giving advice to future travellers on the measures they should adopt in order to keep them in good health in the tropics. In 1664, the Royal Society of London had thoughtfully set up a committee to study the transmission of plants from the East and the cultivation of spices and of medicinal plants. The Company's medical officers were encouraged to study and collect Indian plants particularly those which might have medicinal properties. Specimens were then sent back either as whole plants or as seeds for their possible propagation at home. The benefit of these new drugs was soon apparent.

Like all British medical men in India, Fryer was required by the Company to combine medical knowledge with political skills in diplomatic missions. Requests from Indian rulers and their families for medical help were always encouraged in the interests of good trading. In 1714, officials in Bengal revoked some of the Company's trading privileges, and they decided that an Embassy which included the surgeon, William Hamilton, should reach Delhi. In July 1715, the members of this Committee remained in Delhi for two years. It was an opportunistic time that in Delhi, the Emperor was suffering from some disability that was preventing his marriage. Hamilton offered his services, and his treatment was successful. There is, however, no tangible evidence to indicate that he asked the Emperor for favours for the Company. In any case all the privileges of British surgeons were restored.

EARLY EIGHTEENTH CENTURY

In spite of the augmentation of scientific medical knowledge and simple but effective health measures, the high mortality among the British continued. There were repeated edicts by the Company authorities urging moderation in eating and drinking particularly by those new to the Indian environment. Drinking of tea and coffee was not advised although they were cheap and reported to have medical properties. But the Company failed in its attempt to promote them as an alternative for alcohol. Wines and spirits were consumed in as large quantities as ever, and widely used therapeutically. Arrack, the country spirit made from rice, was thought to be much stronger than brandy, but it was particularly lethal to the European. Though the British learned the Indian methods of making and storing ice to keep water cool, there were few precautions concerning its purity, it was generally believed and rightly so that epidemics, especially cholera, were water -borne.

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The common point of contact of Europeans with Indian medicine was still with the folk practitioners. There seemed to have been little or no treatment of Europeans by Ayurvedic or Unani Indian practitioners at that time. But, if no European physician was available, Indian medical practitioners were to be employed, and listed in the official payrolls. On the other hand, requests from the local rulers for medical help, particularly when a surgical operation was needed, continued throughout the eighteenth century, and a few European practitioners were appointed officially to some Indian courts. But the first Indians to be treated by the European practitioners in a significant way were the soldiers (mostly high caste) recruited for the Company's armies in increasing numbers from the middle of the century. However, their rigid caste-rules began to pose some problems for their medical officers.

The commonest diseases were still fevers and bloody fluxes. Most diseases were being treated with remedies familiar in Europe: bark (all imported) for fevers, opium and impecacuanha for fluxes, mercurial drugs, for venereal diseases and also for hepatitis and many other disorders where the diagnosis was in doubt. Depletion of the body as a result of bleeding and purging, as in Europe, was still carried out in fevers, but was being modified to take account of the different response in a patient debilitated by the climate. Greater attention was paid to the dangers of too much of exposure to tropical sun and the use of too much alcohol as well as the sickly season at the end of the rains. The rest in lodgings was carried out with more care, the higher the altitude of the lodgings the safer they were to get above the dangerous exhalations.

Several types of fever were identified and they were all considered to be due to 'bad air'. Many of the predisposing factors of diseases had now been established,and the precautions to be taken were known, if not always adhered to effectively in respect of the danger of marshes and wet soil, particularly in hot weather after the rainy season; remission in heavy rains and floods; the protection afforded by wood or a large body of water; and the relative safety of sleeping on ships offshore compared with the risks of remaining on land overnight.

Small pox was common all over India, and the British found that inoculation which only recently had been introduced in England, had been practised 'since time out of mind'. Inoculation was carried out more in Bengal than elsewhere. In some other parts, the only measures to cure the infections disease taken were superstitious sacrifices and prayers. The British, however, regarded the Indian method of inoculation or variolation as rational, and noted that the patients generally recovered. Although inoculation in India, as elsewhere, protected the individual, it carried the risk of spreading the natural disease and starting an epidemic.

The diagnosis of plague was always difficult and at the same time, many other diseases were confused with it. In the eighteenth century India, there were many instances when the term 'plague' was used for diseases that would make its diagnosis unlikely. The danger of heat-stroke from over-exertion in extreme heat was not recognised, although sudden death of soldiers in heavy uniforms was not uncommon. Diarrhoeal diseases were always common, and many of them were referred to as 'cholera'. Since many of these apparently responded to the application of a hot iron to the soles of the feet, it is unlikely

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that they were true cholera. But there were also clear descriptions of overwhelming attacks with rapid prostration and death in a very short time. In March 1781, British troops on the march between Madras and Calcutta were affected as if they had been struck by a 'planet'. The diseases then moved on to Calcutta, and from there to Hardwar, killing 20,000 pilgrims in eight days. Hepatitis arose *de novo* or as a complication of some other disease among the British. A flux or a fever was also common. There were many cases of fever with pain over the liver. Even with treatment there could be severe long or continued ill-health, and often the only remedy was to return to Europe. High fever and evening rigors were recognised as sinister signs of abscess formation in the liver, which very often proved fatal.

Venereal diseases were known to be rarely fatal among Europeans and, if they were not cured , they could be kept under control with mercurial drugs. A number of Indian remedies were reputed to have good effects such as the young shoots of a banian tree, boiled in milk with flowers of a coconut tree, which was said to be a cure for gonorrhea. But, in general, Europeans prefered to put up with the unpleasant side-effects of mercurial treatment in return for a more certain cure. Indians also were widely known to have particular knowledge of poisons, but some observers thought that there was no more poison in India, and that the Indians were no more skilled at it than in any other part of the world. But any promising antidotes were carefully recorded. Cochin leg (elephantiasis) usually affected the poorest people and there was no effective local remedy. Had the sufferers applied to the British for treatment, they would have been recommended 'the most cordial and nutritious diet', but it was recognised that they would neither be able to afford it nor would their strict caste laws allow it.

The relative rate at which wounds in general would heal among Europeans and Indians was often discussed. It was generally held that an European soldier withstood loss of blood, whether in battle or from a lancet, better than the Indian, and this was attributed to his nourishing meat diet. But it seemed that not only did this not protect him from infection but also delayed the healing of his wounds. The benefits of the abstemious habits of an Indian were shown by his powers of healing. He was cured of wounds by herbal dressing while for an European it would make an amputation necessary.

The barbiers [beri-beri] was one of the diseases for which the British considered that a change of climate was the only chance of cure. It affected mostly the lower class of Europeans who would be lying drunk in the open air when there would be a sudden loss of function of all or parts of limbs and the paralysis continued for several months. But it was thought that a change of air or environment could bring quick recovery. However, Indians believed that it was mainly a disease of the Europeans and thought that it was due to 'venereal excess'. Their treatment was to bury the patient in sand up to his neck in the middle of the day as he could bear the heat.

Failure of the rain meant famine which was followed by epidemics, and it further devastated the population. There were no effective relief measures. Lack of proper transport facilities meant that little could be done to bring in relief supplies, even if there had been an organisation to bring them.

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BRITISH MEDICAL PRACTICE IN INDIA (1780-1820)

By the end of the eighteenth century there was a growing concern in Europe for public health measures and sanitary reform. Several hospitals and dispensaries were being founded in pursuance of these. Some medical societies were also formed, and medical information was disseminated by new journals. In India, the statistics of morbidity and mortality in hospitals and regiments were supplied monthly. In epidemics, all details—postmortem results, causes and successful treatment—were recorded, and circulated for the benefit of practitioners. Yet, conditions in the cities were still bad, with uncontrolled burial of bodies in shallow graves causing a pestilential smell and pollution of the tanks. But the virtues of the individual Hindu included cleanliness; the free flow of air through the huts (rather than the closed stone houses of the Europeans); sleeping on mats rather than beds, and with a movable stove, so that the whole building was fumigated, and the lining of the floor and walls with cow-dung paste which was thought to be antiseptic. Outside the huts, vultures, butcher-birds, pariah dogs and jackals acted as scavengers. The lower castes smoked constantly, but the tobacco seemed to help their resistance to disease. They ate no butcher's meat so that there would be no remnants as a source of putrefaction. There were no privies, but all went outside the city for their morning ritual; privies in the houses of the well-to-do and the Europeans were instantly cleaned. The first house-tax for repairing and cleaning the streets was introduced in Calcutta in 1794, but no major improvements were made until 1835. Local quarantine precautions were enforced for ships suspected of carrying infectious diseases.

The British Army and Navy had by now demonstrated that it was cheaper to maintain the health of men overseas than to ask their replacements. It was recognised that the death-rate was the highest among the newcomers and that, if they could survive the first few years, they might continue in India for many years in reasonably good health. For this purpose, on landing, the soldiers were sent to 'seasoning barracks' for three months to stay in camps above sea-level and well away from the marshes, avoiding the heat of the towns, and on the positive side, prescribing gentle exercise as well as gradual exposure to the sun.

The British were slowly being convinced of the Indian customs for withstanding the effect of heat by staying in a darkened apartment, drinking bland fluids, eating a little fruit, perspiring copiously and not taking a main meal until the evening. The advice to the newcomer from Britain was to reduce the quantity of his food, to keep it as simple as possible and to consume vegetable food which would be better than meat. Only after the newcomer was 'seasoned' was meat permissible. On the other hand, as late as 1827 all military officers were ordered to wear regulation dress in public though, shortly after, this was modified soon 'in consideration of the climate', except on duty or on parade.

Water, even if freshly drawn, would not be drunk by the British until it had stood for a day to allow any deposit to settle. Many of them insisted that their water should be boiled. There were well-recognised methods of purifying water. Alum or some other astringent would be used in camp or when travelling overland. There was noticeably a decrease in alcohol consumption among British civilians. The earliest newspapers from about 1780 carried every June, the warnings of the dangers of over-indulgence in hot

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season. But alcohol, combined with the effects of the sun, was still a common cause of disease among the troops, although it was still highly regarded as a medicine. Port was good in convalescence after the treatment for bowel complaints, and beer was recommended for scurvy. Spirits were totally forbidden except for external application, but any sort of wine was regarded as good for most disorders, and it was considered essential to overcome the bitterness of the 'bark' (quinine) used for treating fevers.

By now the pattern of diseases to be expected in the East was well-recognised, and had been described in detail by medical writers such as James Lind. The mode of treatment had been standardized, and was to remain almost unchanged for many years. Temperance in all that the foreigners did was recognised as the most important factor in maintaining health in the heat. Among Indians the contrast was between the rich and the poor. The upper classes ate heavily and became as bilious as Europeans, and died early. The working classes who lived entirely on vegetables, did not have the strength of Europeans, but they could work in conditions that would be fatal to an European. They seemed exempt from many illnesses, but if they became diseased they had no stamina or inner resistance to combat the disease. The average length of life of an Indian was shorter than that of an European.

The Company's countryside settlements were often surrounded by very unhealthy surroundings. Woods and swamps were not cleared because they were regarded as natural defences; but in real they were the source of lethal fevers. Quinine was the mainstay of treatment and up to the early part of the nineteenth century, it was used in the form of crude bark. Bleeding was carried out vigorously, and calomel (mercuric compound) was given every 4-5 hours until the patient would be salivating. The Indian dietary regime was then followed; the patient was moved to as cool a place as possible, his hair was shaved, wet clothes applied to his head and body, and copious cold drinks were given. There were also a number of traditional Indian preparations which were in vogue from time to time with the British. These might have to be used when 'bark' was scarce, but some of them were regarded at least as 'the bark', which often deteriorated on the voyage.

In the open countryside where there was no endemic fever, small pox was the major epidemic. In some areas, e.g. the Malabar coast, the treatment for this eruption was by what was called a 'heating' regimen, but this was elsewhere regarded as harmful, and hence cooling treatment was preferred. The Indian technique of inoculation was well established. The inoculators used a cloth impregnated with matter from the previous eruption. After the operation they insisted on a careful regimen of light diet, cooling and fresh air. But inoculation carried a high risk of starting an outbreak of small pox in a closed community as in a city. Recognising this, the inoculators tried to inoculate all members of a village at the same time. On the other hand, there was considerable prejudice against inoculation among Europeans in India and during an epidemic, they fled to the countryside. Nevertheless, inoculation was officially introduced to the British population in about 1785.The first special hospital for inoculation was opened at Dum-Dum (near Calcutta) in 1787 and the inoculation of soldiers and their families was carried out with success. General Orders were issued to the army surgeons to encourage all who

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had not been afflicted with small pox to be inoculated. It was, however, more, difficult to convince Indian troops than English soldiers, but the former began to come forward, along with their children for inoculation. Yet the policy of general inoculation of the civilian population made slow progress. Soon the British surgeons began to train Indians as inoculators. Once the efficacy and safety of vaccination had been demonstrated, most countries tried to discourage inoculation. In India the Government legislated against it, as the old custom was difficult to suppress. Inoculation was banned in Bengal in 1802-3, when it was reported that the mortality was 1 in 200 Indians, and 1 in 60-70 Europeans in Calcutta.

Nevertheless, the first successful vaccination in India was performed on 14 June 1802 by Dr Helenus Scott, on the three-year old daughter of a servant of a British army officer. Within the first few months nearly all the children of European parents had been vaccinated, and surgeons in outlying stations and army units then took up the practice. The spread of vaccination was opposed by the official inoculators whose livelihood was threatened, and the British were astonished at the resistance they encountered generally. Explanatory notices in all Indian languages were sent out to convince the chiefs and respected elders in the villages, and thereafter attempts were made to recruit Indian vaccinators. A number of Indian families took up the profession of public vaccinator. There was no compulsion, and only those who were willing were treated at first. But it was the policy to try to persuade all the members of a community to be vaccinated at the same time. This was important in the early days as there were occasional fatalities. Reports of success began to come in from outlying districts. The Indian vaccinators, who had been trained and given certificates, had little influence outside their own districts except in those areas where they had increasing numbers of successful cases. All British surgeons were required to practise vaccination and to instruct Indian vaccinators and countersign their certificates after instruction. By 1806 the vaccination programme was in full swing. Once the prejudices had been overcome and the efficacy of vaccination demonstrated, common people would often demand that vaccination should be available in their areas also.

Other diseases

Venereal disease was much common on the coast than in the interior of India. This situation in the interior was attributed to the temperance and cleanliness of both the sex. In the towns on the coast, however, the disease had greatly increased with the influx of foreigners. But it was generally agreed that the disease was much less dangerous in India than in Europe. The continual perspiration in the heat meant that, if the disease was treated early, it could be completely cured. The standard treatment still consisted of using mercurial compounds and Indian dressers were employed to carry it out with a mercurial ointment for hours at a time. Many other drugs were tried, e.g.,opium in large doses, China-root and sarsaparilla.

Some snake-bites proved rapidly fatal, but most cases recovered although there was always a doubt whether the symptoms were due to the bite or to the extreme nervous

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reaction of the victim. The authorities agreed that the Indian 'snake bite remedy' should be tested. The details of such remedies (pills) were published for the benefit of general public. But the pills, on analysis, were found to contain high levels of arsenic and, therefore, their use was condemned by the British Physician-General. The other surgeons, however, claimed to have used the pills with good effect, stating that there was no means of knowing enough about the vegetable substances with which the arsenic was compounded to determine whether the former would modify the toxic action of the latter. Rabies (rabid dog- bites) proved as nearly fatal, and all measures for curing it were in vain specially in severe cases. Complete excision of the wound was recommended, followed by cautery or the application of caustics. There was no Indian remedy for this, although it was suggested that the 'snake- bite remedy' should also be used. But its safety was debatable because of high amount of toxic arsenic it contained.

Sudden death from heat-stroke was common in inland stations. Treatment was directed towards relieving the extreme congestion of the brain by bleeding from the temporal artery. But in such cases, general bleeding might also be needed, with cupping the back of the neck with large doses of mercuric chloride and also cold compresses to the head after cutting the hair.

Plague continued to be recognised as a highly contagious epidemic and particularly dangerous to surgeons and attendants on the sick. The overall mortality of people afflicted with plague was greater than 50%. Experience of surgeons in hot climates had led to some modifications in its treatment. But it was realised that bleeding, strong purging, and emetics were ineffective. Acute hepatitis, as seen in Europe with symptoms of rigours, acute pain and shortness of breath, was rare in India. In chronic hepatitis, the 'endemic of India', the first complaint was usually diarrhoea with some tenderness on the right side; if this was not treated, the liver would go on the suppuration, with 50% mortality. The efficacy of mercurial drugs in curing liver diseases in India led to the belief that there was some 'indigenous and local poison peculiar to the country'. Some Europeans were still not convinced that the disease caused by the Guinea worm was due to a living animal. Indians, however, demonstrated the worm, and, if it was superficial, they cut it and extracted it. If it was more deep-seated, they would wait for it to appear and then draw it out slowly day by day. In many cases Indian physicians were called in, when an European had this illness on the assumption that they had a thorough knowledge of this affliction.

THE MID-EIGHTEENTH CENTURY

The wars with the French in India led the British Company to form regular armies fortified with organised medical services. Hence there was a drive for the recruitment of a large number of Indians—mostly high-caste Hindus—who were reinforced with royal troops. The first British regiment reached India in 1760, bringing with it the first Army Medical Department officers.

Although the soldiers continued to wear heavy uniforms that they were accustomed to in Europe, palanquins and umbrellas were seen by the civilians as sensible precautions against the sun. If there was a long distance to walk to transact the Company's business,

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it would be almost impossible to do this in the hot months without getting a fever. Over-eating and drinking were now recognised as the cause of illness in the heat, and many of the British came to relish the local food, although they found that a vegetarian diet was not sustaining enough for vigorous physical activity. The surgeons were becoming more discriminating about bleeding. Younger men, who newly arrived in the tropics, withstood loss of blood; but for Indians or Europeans who had been long in India, bleeding had to be carried out with great caution.

Up to this time the sickness-rate and mortality remained high, with most of the deaths being due to fevers, hepatitis, and fluxes. There was, however, a gradual improvement through the second half of the century because of the better application of measures that were now recognised as necessary to preserve health in the tropics. But, in general, the Governments of three Presidencies (Bengal, Bombay and Madras) still took little responsibility for public health. All major legislations in respect of public health came in the second half of the nineteenth century. The first, but rudimentary measures were enacted in Calcutta. In 1752, J.Z.Holwell carried out the first Census (although his figure of 409,000 patients was probably much too high), and in 1755 he made the first attempt to provide a clean water -supply. He took great interest in the traditional Indian method of inoculation for small-pox, and gave a full description of it in his report to the College of Physicians in London, in 1767.

Interaction with Indian medicine

Most of the British did not endeavour to learn the local languages, although some learnt Persian in order to be able to talk to their Muslim hosts. Even this situation began to change from the middle of the eighteenth century and fraternization, except for political ends, came to be regarded with suspicion. The British no longer accepted treatment from Indian practitioners and, in general, Indian medicine was held in low esteem throughout the eighteenth century. Even the Indians, particularly the rich and the nobles, preferred an European doctor, and they always did so when an operation was needed. Nevertheless, some of the British surgeons, though they were mostly using European remedies, tried to copy Indian prescriptions for curing some local diseases.

Botany was the first scientific discipline to be studied by Europeans in India, with the recognition of the importance of plants and plant products in the economy of the country as well as for their medicinal properties. This led to a systematic botanical survey in some parts of the country to start with. The first volume of the *Hortus Indicus Malabaricus* of Van Rheede tot Drakenstein was published in Holland, in 1678. By the middle of the eighteenth century there were further accounts of the medical virtues of some of the local herbs; yet there was little exploration of the huge range of Indian plant drugs. It was then recognised that the native physicians, particularly on the Malabar coast, knew a great deal about the medicinal properties of their local plants either from their own observation or by learning from their ancestors, besides their general skill in the preparation of metallic and mineral medicines.

Edward Ives, a naval surgeon at the hospital at Fort St.George (1755-57), made an extensive collection of local plants and investigated their therapeutic properties on the

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basis of the information he gained from local physicians as well as through his own trials. In this way he discovered a number of remedies 'totally unknown to our brethren of the faculty in India'. Of his 162 specimens, 80 had medicinal properties–some for curing more than one disease. The commonest remedies were for fevers (17), venereal disease (7) and flux (6) . There were also remedies for bruises and wounds, worms, 'the itch' ringworm, snake-and scorpion-bite, colds, headache, cough, consumption, small-pox, gout, rheumatism, 'berbiers'[beri-beri], swelling in the groin and dropsy as well as purges, besides emetics, tonics and poultices.

There was still no organized treatment of Indian civilians by the British at this time. Naturally there were demands by the poor for medical advice from the European doctors or from any European, when there was no Indian remedy. Medical contact between Indians and Europeans was mostly at the courts of the Emperor and noblemen. As the Company gradually relaxed its restrictions with regard to the entry of Europeans into India, European doctors, who were not in the pay of the Company, came out to India to make their fortunes. Every Muslim princely house had earlier both hakims and vaidyas on its staff. Now many of them recruited one or more European physicians and surgeons as well. In 1778 the Nawab of Arcot had eight European practitioners, two physicians and six surgeons of various nationalities as well as a larger number of both Muslim and Hindu practitioners.

Hospitals, employment and training of Indians

The general hospitals founded in the seventeenth century were, as noted before, intended to serve for Europeans only. From the middle of the eighteenth century, however, a number of 'sepoy' hospitals came up. But in 1785 these were abolished and replaced by individual Battalion Hospitals which were preferred by the troops. The surgeons to Native Regiments firmly held the view that these small individual hospitals were more necessary for Indians than for Europeans. There was also the problem of getting the high castes to take food from any but their own caste. It was necessary for the families of the sick to come in and help, but no respectable woman would go to a hospital. The general pattern of the diet in hospitals was, however, standardized, and the diet tables for Indians were set out separately, but were the same for all diseases. The average daily expense for a European in a hospital was twice as much as for an Indian.

In the meantime, the medical training of Indians had become more formal. After a training period in a general hospital, competent dressers or compounders were given a certificate of proficiency by the Surgeon-in-charge. Their names were then added to the payroll, and they became eligible for pensions on the same terms as other Company employees. As new Indian regiments were formed, Indian doctors were recruited to prepare and administer the necessary drugs. These might have been prescribed by the Company surgeons, but no high-caste Indian would accept food or drugs, that a European had handled. The selection of Company surgeons was now by examination conducted by the Corporation of Surgeons of London and by the Company's own examining board. Examinations were also held in India for promotion, besides for local British applicants

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and for those arriving in India with minimal qualifications. But such examinations were not open to Indians. Up to now the European medical officers had been civilians. With the continuing wars from the middle of the eighteenth century, the principle was established that the officers were primarily military, but temporarily lent for civil duty in which they formed a reserve for the Army, liable to be recalled at any time. This principle was followed later for the Indian Medical Service also. The military surgeons were kept very busy in their profession and thus they became well experienced. They were, therefore, considered first for promotion. The fewer civilian surgeons, on the other hand, had less work to do, as there were still no hospitals or dispensaries for the Indian population and there was little private practice except in the larger centres.

THE END OF THE EIGHTEENTH CENTURY

By its continuing military operations the Company was gradually extending its political power, which led to its becoming the effective government of British India by the end of the eighteenth century. Nevertheless, the widespread corruption among the Company's among local officials in Bengal in the latter part of the eighteenth century had almost bankrupted the country, and this was further exacerbated by the famine of 1770. The increasing concern in England about the state of affairs in India forced the Company to adopt a policy of reform, started by Governor General Warren Hastings. According to this policy, there was to be a gradual reduction of the power of the Company in the nineteenth century. The general attitude of British officials in India was also changing from the concept of 'the Company' with its emphasis on trading, to 'Empire' with its growing political responsibility for the native people who were being governed.

In Europe, the eighteenth century philosophical 'Enlightenment', had brought about great social, political and industrial changes. From the 1780s these changes began to have their effects on India too. Up to that time, European interest in India had been primarily commercial. Now there was increasing interest in Indian history, art and culture as well as in Indian sciences including medicine. Scholars in the Company—the first of these being Hastings, followed notably by Sir William Jones and Sir Charles Wilkins—began to translate Sanskrit works of astronomy, mathematics, medicine and literature. When the results of their scholastic efforts were transmitted to Europe, the European people learned with astonishment the antiquity of Indian culture, science and medicine. In particular, there was a great revival of interest in Indian medicine. Classical Ayurvedic medicine was recognized as having similarities to the Brownian system,* which played an important role in the medical thinking of the late eighteenth century in Europe.

Sir William Jones, a barrister, was appointed a judge in Bengal in 1783. He conceived the idea of a learned society to study all aspects of Indian culture. The *Asiatik Society,* later renamed as the *Asiatic Society of Bengal,* was founded in 1784, with Jones as its first president. He learnt Sanskrit and produced an Indian legal code which was published in

*The doctrine that disease is due either to an excess or to a lack of stimulus (John Brown 1735-88)

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1794. His English translations of the classics of Sanskrit literature which were, in turn, translated into other European languages, particularly German, stimulated Indological studies in European universities.

Jones encouraged the study of Indian medicine, its drugs and herbs, and founded the *Journal of Asiatic Researches* in 1789 to make all the new findings more widely known. 'Discourse the Eleventh', which he gave before the Society in February 1794, contained his thoughts on the value of Indian medicine. He insisted that there was much to be gained from a study of the plants of India for their medicinal as well as for their commercial value. Among those who thought like Jones about the antiquity of Indian culture, there was the feeling that Indian cultural dimensions should not be *interfered* with, and that as much as possible should be *learnt* from it. This policy was applied even when there were possible health hazards like those of the dangers of poorly ventilated and crowded streets and houses, the thatched roofs of which caused many fires. The magistrates would not try to interfere with these traditional arrangements.

The policy of encouraging education for Indians had been laid down to some extent by Hastings as part of his general reforms. He had founded the *Madrassa* at Calcutta (1781) at his own expense, for Indians to study languages and law as well as Unani. Later in the middle of the nineteenth century, several schools and colleges were established to train Indians in Indian medicine, but the teaching was in the vernacular. Some European medical texts were also translated into Sanskrit and Bengali, and most of the teachers were from the Company's medical service. The course was for three years with clinical training at the general hospitals. In the beginning, the dissection of human body was not carried out. The students received a small stipend during training and, after qualifying, were required to serve the Army or Civil Department as Sub-Assistant Surgeons for fifteen years. This in course of time developed into the Civil Assistant Surgeons grade, of whom there were more than 500 in 1914. The existence of the traditional schools acted as a fillip to Company surgeons to take an interest in Indian medicine, and they published a number of their studies. The first edition of a classical text, the *Suśruta saṃhitā,* was prepared by Madhusudan Gupta and was published in Calcutta (1835-6) This was soon translated into Latin and then into German, but reliable translations into English were not available until the end of the nineteenth century.

COMPARISON OF INDIAN AND BRITISH PHARMACOPOEIA

The British in India relied heavily on the supplies of drugs from England. But it would take a year from the time of ordering drugs in England to their arrival in India. Oatmeal for feeding the sick, for example, was generally spoiled by the time it arrived. Even the drugs that were expected to withstand the effects of travel were often damaged in storms or spoiled by spillage. In India, many European medicines either lost their potency during long storage or were destroyed by flood, fire or white ants. British surgeons in India were advised from London to replace the oatmeal by locally obtained rice, and the damaged drugs, by fresh local drugs, which also would be cheaper than the imported products. Moreover, there were no arrangements for the repair of surgical instruments which had

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to be sent back to London for repair, although the surgeons asked for a repair service to be set up in India, employing local craftsmen who had the necessary skills for producing high quality instruments. When medicines in the public store were exhausted, permission was given to buy them locally. The apothecary was responsible for buying the 'bazar' materials for poultices and fomentation, eggs, toddy, plantain leaves, butter, garlic, sugar, leather, cloth and lint for bandages as well as medicinal materials, like quicksilver, opium, nitre, gum arabic, aloes, alum, asafoetida,camphor, liquorice, cinnamon, nutmegs and cloves.

It was being increasingly observed that several drugs routinely used by Indians were found to be effective. There were remedies for certain types of fevers, worms, indigestion, colic, disorder of the stomach, weakness of nerves, hysteria, and constipation as well as for cleaning ulcers and preventing cancerous charges, purifying the blood, gout, leprosy, coughs and spitting blood, sciatica, jaundice, urinary and kidney affections including gonorhoea, bilary disorders and methods for purifying water. Most of the Indian drugs were vegetable or herbal preparations. In the Hindu pharmacopoeias, animal products were rare, compared with the very large number of vegetable substances, though some of them had been rendered obsolete by the development of chemistry. Indian medicines, however, were generally regarded as much cheaper than European medicines, but the latter were often preferred to and kept for the treatment of Europeans. Tests on Indian medicines used to be carried out at the general hospitals, and potentially useful preparations were considered for experimentation.

The intense study of the Indian materia medica led to an extensive botanical collections by the Company surgeons and others, which were used to train young surgeons in the use of main Indian medicinal plants. It was this knowledge that eventually became the basis of the first official *Pharmacopoeia of India* (1868). Medical officers returning from the East brought their experience of new drugs for the treatment of diseases at home. The dissemination of botanical knowledge in India and the scientific correspondence among interested collectors, led to the formation of the first medical societies and the publication of first medical journals. The *Asiatic Society* (1784) was, at first, concerned mostly with botany and natural history. The Medical and Physical Society of Calcutta was founded in 1823; its *Transactions* (started in 1825) was the first medical publication in India.

Indian Medicine and Surgery (1780-1820)

Indian medicine continued to be on conservative lines. The British, while recognising that many of its principles were familiar, were critical of the fact that traditional prescriptions were simply handed down from father to son without alteration. The Indian custom of anointing their bodies with the oil of sesamum, thus blocking the pores of the skin, was at variance with the practice of European physicians who regarded it as a dangerous one since it would close too many pores at one time and free sweating was always recommended by them. Little or no general surgery was being practised by Indians at this time, although some minor operations were carried out here and there mostly using

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cautery or caustics only to deal with small tumours. Enlarged spleens were treated with actual cautery followed by small incisions by inserting needles to a depth of about half-an inch, or heated nails were plunged more deeply. Threads that were medicated with caustic paste were used to heal sinuses and fistulae, a very effective method that had been described by Suśruta. But the removal of tumours by the cautery left deep scars. Limiting to a certain size, the lesion was regarded as unsuitable for treatments, and the patients either came directly or were referred to the nearest European hospital.

Some major operations persisted as a tradition in a few but scattered medical families, wherein a surgical craft had been handed down from father to son. Three such operations in particular came to the notice of the British: operating for the removal of stone in bladder, couching for cataract and grafting skin for restoring deformities of the face, as had been described by Suśruta. The techniques of the first two had remained unchanged. The grafting operations were carried out earlier by an experienced member of the *kumbar* (potter) caste at some unknown time but earlier than the eighteenth century. Later it had been strikingly modified. The technique of operating for the removal of stone cutting for stone was the 'low lithotomy' which had long been practised in Europe. But one can find an account of lithotomy in the *Suśruta Saṃhitā* also. Though some of their operations were successful, the Indian surgeons were criticised for not keeping records and also for not being prepared to operate in unfavourable cases without indemnity from the authorities.

Suśruta had written extensively on diseases of the eye including the cataract operation. Company surgeons at first recommended this practice, particularly for training native practitioners to carry out the procedure in areas where no European skills were available. In general, the high rate of complications of the Indian technique led to its gradual abandonment leading to its replacement by proven techniques introduced from Europe. In one respect, however, Indian surgeons had blazed new trail, i.e. skin-grafting.

In skin-grafting for the restoration of mutilations of the face, the classical operation as described in the *Suśruta Saṃhitā*, consisted in using flaps of skin from the cheeks to repair defects of the nose, lips or ears. Since the amount of skin available on the cheeks was limited, only relatively small defects could be repaired. But, the potters had developed a method of using the much larger area of the skin of the forehead. Their technique was studied and copied by Company surgeons, and an account of this reached England in 1794. This attracted the attention of surgeons all over Europe as well as in far off America, and it was the starting-point for the modern specialty of plastic surgery. Since that time the technique has always been referred to as the '*Indian*' operation.

Treatment of the British by Indian practitioners

The wide and traditional experience of curing practitioners in Indian diseases encouraged no doubt several European surgeons to learn as much as they could from the former. The disadvantage, however, was that there were no specific treatises on individual diseases, and the contemporary writers only repeated the teachings of the classical authors. In respect of treatment, the efficacy of a prescription was believed to increase with the

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number of its ingredients. This had, at an earlier period, also been the view in Europe. But during this time polypharmacy was out of fashion even in Europe. Nevertheless, the British felt that some of the Indian drugs might show active substances that deserved further study. With the revival of interest in Indian medicine, some European surgeons consulted local practitioners, because of their view that the Indians must have far greater experience of tropical diseases than the surgeons who were fresh from England. There were also complaints by Company surgeons of the need to rescue some of these patients who had enthusiastically adopted Indian methods. Successful treatments led to the dissemination of the knowledge of Indian medicine by grateful European patients in India, and to the publication of the prescriptions for general information. One of the most successful Indian treatments was the 'principle of cooling' for fevers, and it was recommended that this should be generally adopted. However, native remedies had little effect on the course of dangerous diseases and, indeed, sometimes made them worse.

Treatment of Indians by the British

Company surgeons were now increasingly involved in the treatment of Indian patients. British troops were seconded for service with Indian princes and some British medical officers were with them. The surgeons were also required to attend on the princes and the members of the royal family. In the event of successful treatment, the prince would make a special application for the surgeon to stay on, and the Company readily agreed to such a proposal or made special postings so that the surgeons were available for the prince and his family during ill health.

The Company's Indian soldiers were predominantly Hindu. The British officers of the Company watched repeatedly the cleanliness of the Indian soldiers and the rapid healing of their wounds. But their strict caste-rules prevented them from taking any medicine unless it had been prepared by one belonging to their own caste. If they were moved out of their accustomed surroundings, they were found to be particularly susceptible to the diseases of a new environment. There were also problems of taking them overseas; for example, on board ship they were allowed to carry their own water and provisions, but if these ran short before the end of the voyage, they would risk dying out of thirst and hunger rather than taking what they thought of as impure nourishment.

The British surgeons assumed that the Hindu, with his vegetable diet and abstemious habits, would withstand surgical operations and recover better from the effects of injury than the over-fed alcoholic European soldier. But, in spite of the rapid healing of their wounds, it was soon found on campaign, that surgical operations were less successful in the case of Indian soldiers than among Europeans.

In hospitals in Europe, both military and civilian, there had always been a relatively high proportion of patients suffering from ulcers of the legs. This was linked to the prevalence of scurvy—either florid or as a pre-scorbutic state—which, however, began to decrease after 1795. The ulcers were complicated by frequent outbreaks of hospital gangrene. In India, such an incidence was noted particularly among prisoners in gaols,

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chafed by their fetters. Many of them were under-nourished and there was high mortality among them, although a few were saved by amputation. There were also sporadic cases of scurvy in villages among the poor and the ill-fed, particularly in the cold season and after the failure of crops. For example, in Bengal, a failure of the crops in 1768 was followed by a severe famine in 1769. In the early part of 1770, diseases broke out and by May of that year more than one-third of the population in the worst affected areas had died. Although there were good crops in the next year, there were too few people left to harvest them, since in the period of nine months ten millions had died.

Outbreaks of scurvy were also increasingly reported from Indian regiments in various parts of India. The Hindus on a diet of rice were the first to suffer. The Muslims, who were allowed meat, were protected until rising prices did not permit them to buy enough meat. Even when the diet was known to be at fault, religious scruples would often prevent any dietary change. The only treatment for scurvy was to send the sick home, and then they all recovered! Such a practice was in vogue during the occurrence of any epidemic among Indian troops, which was impossible to control. Many of them no doubt improved, but some died as they were too poor to have any other means of support when they were away from the regiment. There was another problem, namely,,if large numbers were sent away,the depleted numbers that remained were overworked, and morbidity increased.

In the general reorganisation of the Company's medical services in 1789, a system of Station Hospital was introduced. But the Indian regiments petitioned to their individual Battalion Hospitals that they should remain in their places, and they had the support of their medical officers. Each battalion was staffed with one European assistant surgeon and one or two Indian dressers. Deductions used to be made from each soldier's pay to cover the Indian payment to a dresser as well as to the supply of local medicines, and a surgeon was provided whatever European medicines were necessary for administration by the Indian dresser. On campaign, Field Hospitals were also set up. The transport required for the sick for an army of 10,000, of which 4,000 were Europeans, was: 320 coolies with 1600 bearers, 120 wagons with 400 bullocks, 5 superintendents for the doolies and 5 for the wagons, a smith and a carpenter, each with l0 other men, with additional rattan (splints) men and tailors, 12 tents for the sick, and two marquees for preparing medicines and for the attendants to sleep in.

As noted earlier, up to 1792 there had been no regular provision for the medical treatment of Indians who were not in the service of the Company. In that year, the first hospital in Calcutta was opened for Indian civilians. Medical officers were increasingly urged to treat all classes of Indians, and both Hindus and Muslims were eager to call on English physicians when they were seriously ill or when treatment was needed for their women. But the British surgeons were, at first, concerned that this might interfere with their primary responsibility towards the armed forces. Regimental surgeons with their troops in country districts were often overwhelmed with requests for medical help by local inhabitants. It was then the official policy to encourage this, with a view to promoting goodwill for the Company's political aims and as part of the growing feeling of responsibility for the areas under Company rule. The local problems could be exacerbated by a large number of pilgrims passing through the district, bringing with them new and

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epidemic diseases. In general, the British surgeons soon found, as with their earlier experiences with Indian troops, that they had to modify their more vigorous treatments to conform to the physical constitution of a Hindu. In treating a sick Englishman it was necessary to repress the inflammatory process, whereas an Indian patient required supportive measures. This difference was even more marked when compared with the poor response of the inhabitants of cities than that of the better-fed country-dwellers.

By 1802, there were three large general hospitals in the Bombay Presidency, seven in Madras, and six in Bengal. They were supported by public and private subscriptions, staffed by Company surgeons and supplied with medicines from the Company Dispensary. They managed by equal numbers of European and Indian medical personnel. A Large number of trained attendants were employed, one to attend on every six patients, and one to attend on any single patient when the surgeon thought it necessary. By 1805, the hospital in Calcutta was admitting 220 patients with 2874 out-patients and there were 1286 vaccinators. The bulk of the patients was destitute paupers sent in by the police, and more than 50% of them had wounds and other injuries. Twenty-one had ulcers and sores, but the recorded incidence of infectious diseases was quite low. The first 'mofussil' hospitals came up in the 1830s often on the initiative of individual Company surgeons. By 1842, there was six in the Madras Presidency outside Madras. The main hospital in Madras served half of European military and half of European civilians. There were separate wards for European women and children, and Indians of both sexes.

There was no special accommodation for the insane until the end of the eighteenth century. Before this, they were housed in prisons, often fettered. Any insane European who could be restored to a reasonable state of health was shipped home. As part of the general lunacy reform movement at this time, individual Company surgeons began to collect money for separate buildings, in which they gave their services free, as this was not then a part of their duties. A hospital for insane Indian soldiers was set up in Calcutta in 1798. An asylum for civilians was also opened in Calcutta in 1802, followed by similar arrangements in Madras and Bombay. By 1820, there were six asylums in Bengal (each holding 35-170 patients), four in Madras and one in Bombay. The patients, who were fed at Government's expense, remained healthier than ordinary prisoners who received a much smaller allowance, and were subjected to hard labour.

WESTERNIZATION (1820-1850)

During this period of thirty years, the Company continued to extend its area of influence in India. All military action was still taken in the name of the 'Company', but there was more and more talk of 'British India'. In Britain, there was a growing criticism of the Company's management of Indian affairs, but there was no other organization that could take over. In India, the Company's civil administrators were becoming responsible for a large section of people. Measures were undertaken to improve their living conditions and to set up some sort of social services. This was the beginning of the Imperial (now Indian) Civil Service. But new recruits for administration were required to study Indian languages. A medical officer-in-charge of training Indian doctors had to show that he was capable of

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reading Indian treatises on medicine. He could qualify as a vaccinator or carry out residency medical duties until he had passed the prescribed examinations not only in Hindustani but also in the local language.

But with the rise of imperialism, the liberal influence of men like William Jones began to wane. To the reformers, secular and religious, the only course for India was thought to be the development of education on western lines. This policy, introduced by Macaulay in 1835, was also reinforced by the adoption of English as the official language and medium of instruction. Earlier the Company's Charter of 1813 had also included a clause to permit the licensing of missionaries, which resulted in intense Christian activity. In course of time, there were also other measures of westernization which was widely thought by the Indians to be an attempt at Christianizing them. This reversal of the earlier liberal attitude of the company to Indian culture included also Indian medicine, which was seen to have remained static while major advances in the medical field were taking place in Europe.

In 1833, the Grant Committee, under Governor Lord William Bentinck, recommended that the Indian colleges that had been set up by the Company should be closed to make way for teaching medicine on purely western lines. After 1835, there was practically no official support for Indian medicine, and most Europeans were also increasingly opposed to such support, as the middle and richer classes of Indians came to make increasing demands for European medicine. There was no patronage for Sanskrit or Ayurveda, except from the rulers of some Indian states or zamindar families. In such a situation, there were moves by individuals to initiate local schemes in order to make use of Indian practitioners when it was realised that theirs was the only medicine that could reach many of the villages. But these schemes carried little general support. The result was that increasing numbers of medical schools were set up on western lines. There was, at first, opposition by high-caste Hindus towards training in western medicine with its reliance on a knowledge of anatomy gained by human dissection. A great step forward was taken on 10 January 1836 when the first dissection was carried out by Pandit Madhusudan Gupta who was widely respected for his liberal views. During their training, the Indian students worked in the General Hospital, the Native Hospital, the Company's Dispensary, the dispensaries for the poor, and the Eye Infirmary. In 1839 the first four students graduated from Calcutta, were appointed as Sub-Assistant Surgeons. Nevertheless, the first competitive medical examination in India (held in January 1855) was only to the British candidates.

MEDICAL PRACTICE

In Europe, advances in chemistry meant that physiology was in fact the study of chemical reactions in the body. Alchemy with its esoteric dimensions had been discredited, but some of its iatro-chemical aspects were retained. Analyses of standard drugs led to the isolation of their active principle with greater effect and more certain dosage. Detailed studies of the pathology of disease and the application of statistics to treatment, showed the inefficacy of the old heroic measures. Homoeopathy too had started as a regular part

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of medicine; but, under critical analysis, it had been reduced to a sect. The surgical experience of the Napoleonic wars gave stimulus to the concept of a localized pathological process which might be possible to cure, whereas it had been impossible to operate on the lines of the so called traditional 'humours'. From 1750 infant mortality had been falling, but the adult death-rate was unchanged in spite of control of diseases such as smallpox and scurvy. Germany had already started measures to improve public health, but in England there was no progress in this direction till 1830, when it was spurred by advancing cholera. In India, the mortality among Europeans was approximately double than that in Europe.

As for the Indian medical system, there were several criticisms. Even at this stage, however, some British physicians still thought that it should be possible to learn something from Indian practitioners who had understood the conditions of diseases that were not well known to Europeans. For this reason some of the Indian treatments were believed to be rational and could be copied with modification in the context of advances in western medicine. Nevertheless, Indian patients who needed major operations continued to be referred to British surgeons who now regularly reported their operations for lithotomies, amputations, and the removal of tumours of jaw, orbit and other parts of the body. A number of these operations were carried out under hypnosis—a technique that had been learned from the Hindus. In 1840, a committee of investigation reported favourably on the method, and it would have been more widely adopted had it not been for the development of anaesthesia and the introduction of chloroform into India in 1849.

Homoeopathy which was to become later one of the official branches of Indian medicine, was brought to India from Europe in 1838 by John Martin Honigberger who was one of the personal physicians to Maharaja Ranjit Singh in Lahore. Ranjit also had both Unāni and Ayurvedic practitioners on his staff so that he was accustomed to take three types of medicines for every complaint depending upon the exigencies. Honigberger also urged the study and the use of local plants, besides trying out some of the local remedies and finding them to be effective. He gave most of his medicines in the dry state, as the Sikhs would not take any medicine prepared with liquids by European hands.

During this period medical reforms were slowly introduced in India. Regular accounts of the pattern of diseases in different parts of the country were now appearing. Public health measures followed those that were enforced in England, but only after a lapse of time, and the major reforms for improving public health came only after the end of the Company rule in 1857. The religious objections of the Hindus to postmortem examinations were at first respected. But as post-mortems became more common, meticulous observations of the dead bodies were made, although these did not, in the beginning, lead to any major therapeutic advance. The value of bleeding for fevers was now being questioned, and it was gradually abandoned as it became clear that the effective remedy for fever was 'bark' (quinine). Mercurial drugs had earlier been recommended for many diseases in India, but this policy was also changing, since the 'mercurial disease' from its over-use was becoming less common, although Indian practitioners continued to prescribe mercurial drugs indiscretely.

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Vaccination was slowly gaining ground, but not as fast as had been hoped. In this respect, the resistance of Indian inoculators was a powerful factor. In 1831 there were still 10-15 *tekadars* in Calcutta. Their own activities meant that smallpox was still kept alive in the city, and then spread to every part of Bengal. Some of the inoculators were persuaded to be trained as vaccinators. In several country districts there was still opposition to inoculation, but in a severe epidemic that occurred in Bengal and, seeing the beneficial effects of vaccination on their neighbours, people came increasingly to British medical officers. Though inoculation was made illegal in England in 1840 and was condemned by the Government in India in 1870, it continued on a limited scale throughout the nineteenth century. Cholera reached Britain in 1831. Many medical officers in India had direct experience of the disease. Most of the early attempts at the control and the treatment of cholera in England were at first based on the Indian experience. Scurvy was a major problem in the First Burmese War of 1823, while malnutrious conditions were particularly severe, with a high sickness rate. Both European and Indian troops suffered from scurvy. The Indians recovered more slowly and had a higher mortality. They lacked suitable food and clothing, and they could not be persuaded to alter their dietary habits, although it was recognised that the cause of their sickness was the lack of fresh vegetables.

The second half of the nineteenth century

By the middle of the nineteenth century, the approach of the medical services began to change from primarily military to a civilian service. The busy civil surgeon had the responsibility for the local hospital and dispensaries for Europeans and Indians, the jail, the health of police, as well as his official and private patients. Conditions in the jails had been appalling, as they were crowded with prisoners and there was a high mortality among them. But there was an improvement when the care of prisoners became part of the duties of civil surgeons who were required to send regular reports on their condition. The military surgeon, in times of relative peace, had more opportunities for research into tropical diseases. In 1897, the separate medical services of Bengal, Madras, and Bombay were combined into the Indian Medical Service, and the doctors assumed military titles.

Scientific work by Europeans in India had been, to a great extent, limited to the field-sciences, which were mainly for their political, military and commercial advantages. The Company also supported particularly the engineers and doctors for its own services. When Indians were recruited, they were invariably in subordinate posts. In medicine, training was introduced to fill a demand for personnel, but this led to the sub-assistant grade at a correspondingly lower rate of pay. The Educational Despatch in 1854 recommended that there should be residential universities in India. The first three were founded in 1857; Calcutta, Bombay and Madras, followed by Allahabad (1882) and Lahore (1887). But even after the reform of the educational system there was relative neglect of the teaching of science. But the situation gradually improved and scientific research, which had been largely controlled by the scientific services, began to be pursued also by the universities. By the end of the century and two decades later, important scientific researches were carried out by Asutosh Mukherji in mathematics, J.C. Bose and

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C.V. Raman in physics, and P.C. Ray in chemistry.The Indian Association for the Cultivation of Science and the Indian Institute of Science were founded in Calcutta (1876) and Bangalore (1909) respectively.

In the twentieth century before Independence

Between 1912 and 1917, as a result of a number of Medical Acts of the colonial Government, Medical Councils were set up in the Provinces which laid down qualifications for the registration of medical practitioners, and also made it illegal for a registered practitioner to be associated with Indian medicine. The Indian Council of Medical Research was set up in 1912.

From the 1920s, however, there was a resurgence of official interest in Indian medicine. The first Committee on Indigenous Systems of Medicine in the Madras Presidency reported in 1923 that, as Indian medicine was the best way of reaching the majority of the people, it should be developed by taking into account recent advances in medical science with proper training schemes and facilities for research. Nevertheless, no action was taken on this recommendation. In the 1930s and 40s a number of other committees were set up to study and encourage Indian medicine. In 1921, a Chair of Pharmacology was established at the newly created School of Tropical Medicine in Calcutta, to study the properties of Indian medicinal plants.

In 1946, the report of the Bhore Committee (The Health Survey and Development Committee of which Bhore was the Chairman) was published. This only dealt with modern (western) medicine, and there was wide-spread criticism of its recommendations. Soon the Chopra Committee on Indigenous Systems of Medicine was set up and its report was published in 1948. The Committee urged the integration of Indian with western medicine so that a student could be taught those aspects of western medicine that were not part of Indian medicine. In 1969, the Central Council for Research in Indian Medicine and Homoeopathy was established with the particular responsibility for the evaluation and standardisation of traditional drugs. The Central Government now supports six separate medical systems—'modern', and the five that make up 'Indian' medicine—Ayurveda, Siddha, Unani, besides Homoeopathy, Yoga and Naturopathy, Each of these has its own training schools and hospitals.

CONCLUSION

Indian and modern medicine are still running in parallel, as they have been since the seventeenth century. But it is now being recognised increasingly that the two systems are complementary and there is a great need for their integration. Indian medicine deals more with chronic than acute diseases; there is very little surgery, and no measures for treating cases of accidents or of emergency or accident work. All acute conditions are referred to the modern hospitals. Treatment is directed generally to the relief of symptoms, mostly based on traditional remedies, although increasing use is now being made of

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modern pharmacopoeia, particularly of antibiotics. The training colleges in Indian medicine require their students understand the practice of modern medicine, particularly surgery, eye diseases, and public health.

Ayurveda and Unani are 'humoural' systems, as was European medicine up to the middle of the seventeenth century, though they are both allopathic like modern medicine. But their methods of diagnosis differ from those of modern medicine; patients with an Indian diagnosis may often have to undergo different modern diagnoses. The classical texts are still the authority for much of the practice of Indian medicine today. They stress the prevention of disease by general measures such as diet, which are adapted to the needs of an individual, and adjusted in accordance with the time of the day, the climate and the season.

The classical Indian medicine is primarily 'holistic', assessing the whole individual and his constitution as well as his environment. Measures are prescribed not only to cure diseases but also to maintain health and balance, and to prevent future disorders. Treatment for the relief of symptoms is with remedies which are mainly herbal and which, it is repeatedly stressed, do no harm as compared with powerful 'modern' remedies with their undesirable side-effects. Indian medicine, as practised today, has adopted the modern approach, to some extent particularly in the increasing use of antibiotics.

Modern medicine is based on the concept of disease as an entity, for which there is a specific remedy either known or to be discovered. Nevertheless, it pays less attention to a patient's personality, constitution or mode of life. Today there is a growing realisation of the importance of environmental and psychosomatic factors in the diseases of modern life. Modern medicine also is now moving towards a holistic approach like the traditional Indian system.

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CHAPTER 19

Folk Medicine in India

Sathyanarayana Bhat

The term, *folk,* can refer to any group of people, who share at least one common factor. It does not matter what the linking factor is: a common language or religion; but what is important to note is that a group formed for whatever reason will have some traditions which it calls its own, traditions which help the group have a sense of group identity. Folk may be a group, which could be as large as a nation or as small as a family. (Dundes, 1978).

The spectrum of societies in a large country like India presents different systems. Like any other country, in India too, religion, morality and medicine co-existed together then as now. The diverse ways and means of therapies are strongly based on empirical knowledge gained from wide and varied experiences, intuitions and practices which have been understandably adopted after keen observation. Attempts were also made from time to time to codify them systematically. In India, such a codified knowledge has been identified as Ayurveda, while the overflowing under-current of empirical knowledge at large is identified as folk medicine. No doubt, Ayurveda is the specialization which evolved from folk medicine.

Folk medicine as healing art is as old as man. Disease is an expression of man's dynamic as well as haphazard relation with his environment. Accident, deformity and sickness are the common miseries encountered by man, and simple measures to prevent or cure to relieve such miseries is folk medicine. Many small home remedies and practices, ancient or of more recent origin, and cherished and practised by many people in industrial societies, are neither truly folk nor are they essentially scientific. They can be regarded as a manifestation of *popular medicine,* while folks resorted to prayers, incantations, horoscopes, divination, amulets and the use of mineral, plant and animal substances as drugs (Bannerman H.R.).

When religion, medicine and morality are found together in the behavioural act or event, folk medicine becomes *social medicine* to an extent not found in an industrialized society. A great part of the task of folk medicine, however, and especially of preventive medicine, is borne by cultural practices which, although oriented towards different social

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purposes, have important functional implications for health. In all societies, rudimentary medical knowledge is an aspect of culture, and the practice of folk medicine is variably institutionalized (Charles, H.P.).

ATHARVAVEDA

Nurturing Lessons From Nature

In practice, trained folk physicians hardly fail in their healing art. The practical training, which they accumulated over a long period, had passed through the tests of time. The traditional lore is embodied in the opinions of a vast number of observers over their long span of life. Primitive man observed animals for the selection of medicine and food. It is interesting to note that the hippopotamus has taught the first lessons of surgery i.e., venesection. This animal strikes its leg against a pointed reed and gets a vein punctured to allow the flow of bad blood which may have caused an itch. Cats and dogs eat grass to vomit the food, which causes discomfort. Large animals lick their wounds for rapid healing. The Egyptian Ibis bird taught the lesson in enema, by irrigating its aboral end with its long beak. A verse in Sanskrit says *bhaiṣajyavidya guravaḥ paśupaksiṇah*, which means that animals and birds are the teachers of healing art. The following Atharvavedic verses support this statement further:

(i) *Varāho veda vīrudhaṃ, nakulo veda bheṣajam. Sarpa gandharva ya vidusta asma avase huve'.* (The plants shown by the wild boar, mongoose, serpent, and heavenly men may be plucked and given to this patient).

(ii) *Yā suparna angirasi divya ya ragatoviduh, vayamsi hamsa ya viduryase asarve patatrinah. Mṛgayā viduroṣadhīṣṭa asma avase huve.* (To enrich body tissues, the plants shown by hawk, bird, swan or any wild animal may be used).

(iii) *'Yavatīnāmoṣadhīnangavah prasnantuayati ramajavayah, tāvatīstubhyamoṣadhih sarmayachavantabhṛtah'* (The plants consumed by wild and domesticated animals are good for health and can be used for your health).

(iv) *'Puṣpavitah Prasumatih phalinī saphalā utah, sa mātaram iva duhamasma ariṣṭattataye'.* (All flowering, sprouting, fruiting and fruitless herbs will nurture you, like a mother nurses her baby).

Ayurvedic practitioners believe that the healing tradition is without a beginning. Continuation of life is eternal; similarly, continuity of medical science. There is a beginning only in its systematization, but not to healing tradition. Two types of healing arts existed during the Atharvavedic period(c.1000 B.C.). The *Angiras* were the priestly healers, who used various charms to cure aliments. Atharvans belonged to the second school of healers, who employed generally amulets, minerals and plants for healing. The Atharvavedic traditions are still living through Indian folklore. Faith in charms and amulets is essentially deep-seated in the Indian ethos.

Atharvans described also the human anatomy, though not in a systematic way that is known to us now. *Parṣni sūkta* ascribed to one Narayana contains several human

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anatomical references: *parṣni* (heels), *gulpham* (ankle bones), *aṅguli* (digits), *ucchlankhu* (metacarpal and metatarsal bones of hand and feet), *prathiṣṭha* (base), *astivantau* (patella), *jaṅgha* (shanks), *jānu* (kneejoint), *śroni* (pelvis), *ūru* (thigh), *urah* (breastbone), *grīvaḥ* (windpipe), *stanau* (breasts), *kaphodau* (shoulder blades), *skandaṃ* (scapular blade), *pṛṣṭih* (backbone), *amsau* (collar bones), *lalāta* (brow), *kakatīka* (central facial bone), *kapālam* (Cranium with temples), *hanu* (jaw), *kilāsa* (spinal column), *anukaya* (vertebra), *nāsikā*(nose), *karṇa*(ear), *cibuka*(chin), *jihvā*(tongue), *udara* (abdomen), *kīkasa* (ribs), *trika* (coccyx), *śepha* (penis), *yoni* (vagina), *garbhakośa* (uterus), *mūtrakośa* (bladder), *gavanī* (uterus), *antra* (intestine), *asthi* (bone tissue), *majjā* (bone marrow), *snāyu* (tendons), *hamanī* (artery), *nakha* (nail bed), *tvak*(skin), *loman* (public hair), *plīha* (spleen), *yakṛt* (liver), *kukṣi* (abdomen) and *nābhi* (umbilicus). Thus, various external internal and visceral organs as well as tissues have been described in the Atharvaveda (Karambelkar, 1961, and Purushottama, 1958).

Conception of foetus, pregnancy, miscarriage and conduction of labour are very well described in Atharvana texts. Diseases and general treatment methods have also been well defined: *takman*(fever), *kuṣṭha*(skin disease), *kāśa*(cough), *balāsa*(wasting disease), *udyuga* (anemia), *harimā* (jaundice), *jayanya* (consumption), paman (eczema), *śīrshakti* (headache), *kankuśa*(earache), *alji and nirala*(eyeache), *asrava*(watery stool), *anka*(arthritis), *jalodara*(ascites), *vidradhi*(abscess), *rakthasrāva* (bleeding), *hṛdyota* (heart disease), *yakṣma*(pulmonary tuberculosis), fractures, hair fall, venomous bites and hereditary diseases also have been described in Atharvan texts (Karambelkar, 1961, and Purushottama, 1958).

The Artharvaṇa treatment was very simple. Medical charms or plants were employed either in the form of amulet or otherwise. For example: *Añjana* is a plant, which can be used in the form of an ointment, amulet, bathing water and decoction to drink (AV.19.45.4). As Artharvaṇa is primarily a charm system, the charm was systematically accompanied by an amulet. Later, magical potions made of healing herbs were employed for drinking. Plants, roots, barks, leaves, flowers, fruits, splinters, or juices were used for this purpose. For example, *Ajaśṛṅgi* (*Gymnema sylvestre*), in demon destroying; *amula* (*Gloriasa superba*), as an poisonous amulet; *aparājita* (*Clitoria ternatea*), as an amulet for long life; *Arjuna*(*Terminalia arjuna*), to purify blood; *aśvattha* (*Ficus religiosa*), to change or to select foetal sex; *Abaya* (*Brassica nigra*), for eye disease; *udumbara* (*Ficus racemosa*), as an amulet; *Kapittha* (*Feronia elephantum*), to promote virility; *kusta*(*Costus speciosus*), in fever; *khadira* (*Acacia catechu*), amulet; *guggula* (*Commifera mukul*), for injury; *tila* (*Sesamum indicum*), fuel; *darbha* (*Imperata cylindirca*), amulet; *durva* (*Cynodon dactylon*) amulet; *palāśa* (*Butea frondosa*), amulet, for long life; *Madhūka* (*Madhuca indica*), in order to make speech, act and thought of a man, sweet (hypnotizing effects); *yaṣṭimadhu* (*Glycyrrhiza glabra*), for virility and erotic success; *vaca* (*Acoruscalamus*), germicidal; *śatāvara* (*Asparagus recemosus*), in about 100 diseases; *sadampuṣpa* (Calotropis gigentea), to destroy demons; and *haridrā* (*Curcuma longa*), skin spots.

Since medicinal plants grow on the earth with the help of water, the earth was used as medicine. Lumps of mud from the fields were used as an emetic. Ant-hill mud was used as an amulet or in the cure of poisonous bites. Mud from the hole of rats i.e., from the mole hills, was also used for constipation. Beehive with mud was found to be in use for

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curing poisonous bites. Mud from the place where dogs lived was also used for paralysis. Products of cow were used for holiness and remedial purposes. Wine, milk, curds, buttermilk, ghee and dung were employed both internally and externally. Hair and skin of the red cow were used as an amulet; yellow birds were used in jaundice. Porcupine and ants were employed against poisons. *Paidava*, an insect living on horses, was used to remove poisonous effects. Honey was used as a heart tonic, and wax as a base for healing ointments. Atharvan medical rituals were generally carried out in front of fire as well as water, and the medical practices were of semi-religious nature. *Pauṣṭika vidhi* (beneficial rites) and *ghoravidhi*(witchcraft rites) were the two distinct methods undertaken to chase away demons and diseases.

The typical use of amulets in the Atharvan medicine is significant, because they were worn for miraculous effects. The Atharvaveda considers an amulet 'as a living force better than a thousand medicines'. *Śatāvara* (*Asparagus racemosus*), *guggula* (*Commifera mukul*), *udumbara* (*Ficus racemosa*), *darbha* (*Imperata cylindrica*), *daśavṛkṣa* and *añjana* were among amulets of plant origin. Gold, silver and iron balls were also used as amulets. Powdered shell, leather bladder, dog's saliva, teeth, grass pollen, rock salt, old cloth, broom, bow string and dust of old wood were also used in various treatments. Breast milk was considered, and rightly so, as the best vehicle for infant medicine.

Specific theories on the causes of diseases have been found in Atharvana texts. In the context of *kilāsa* (vitiligo), four causes have been described—communication by contact (*yattrachi*), sufferer's own signs of past life(*asthijasya*), inheritance by parents(*tanujasya*), and witchcraft or infection, to determine the four varieties of vitiligo. Breathing the same air, eating with or wearing the clothes or ornaments of lepers would produce the first variety; if the disease is deep-seated in the parents' bones the new born would inherit it. Skin diseases were viewed as a result of the sins of former life. Atharvavedic charms were employed for various purposes. Some sample charms are given here: *Savitah śreṣṭheṇa rupeṇasya naryagavinyoh. Pumāmsaṃ putrmadehi daśame sūtave* (A.V.5.25.21). This charm was instituted to get a male child. To conduct easy and safe labour, the following charm was chanted: *Vi te bhinadmi mehanam vi yonim vi gavinike. Vi mātraṃ ca putraṃ vi kumāraṃ jarayunava jarayu pādyataṃ.* (1.11.5). To alleviate the poisonous effects of snake-bite, the following charm was used: *Apehyarirasyarirva asi, vi se visamaprakta viśhamidva apṛktah, ahimevabhya petri tam jahi.*(7.19.1). A pregnant woman was protected from evil spirits by chanting the following charms: *Palalānupalalau sarkaṃ kokamalimlucaṃ palījakaṃ, asresam vavrivasa saṃṛkṣagrīvaṃ pramīlinaṁ* (8.6.3). *Māsaṃ vṛto mopasṛpa turumavasṛpontara. Kṛṇo—myanysai bheṣajam bajam duṛṇāma cātanam*(9.3.1).

TENETS OF MEDICAL WISDOM AMONG FOLK TODAY

Personal hygiene

Chewing sticks of plant origin is used for cleaning the teeth. Neem stick, mango or cashew leaves (with mid-rib as tongue cleaner) is used as a brush. Charcoal powder or red soil

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is also used as dentifrice. Ablution of aboral end after defecation is done with mud and water. Hindu scriptures suggest 5,10,20, times of ablutions. Cold or hot water bath every day is a must for Indians. Pious people take dip-baths in flowing water, and some people bathe each time after defecation. Seasonal clothing habits are normally found. In extreme hot climate areas, men wear caps, and women cover their heads with their long free end of the saree. Working class people wear areca-leaf-pad caps.

Anointing oil on to the head is a social custom. Indian classical medicine advocates it very much as a healthy habit. The classical texts explain the three vital places, where oil has to be administered daily. But it is astonishing to know that an oral ballad in South Indian dialect, Tulu, refers to 9 types of oil administration (*Nettig neyyeṇṇe, kannug teliyeṇṇe, munkug naccindeṇṇe tigaleg panieṇṇe, kebik kileṇṇe, sandg sandeṇṇe, berik beppeṇṇe ugurug uriyeṇṇe, padoddu teja mutta maimuriyappa eṇṇe, sara kadya candired tampayer sarakadya bendrd beppayer*). Scalp, eyes, nose, chest, ear joints, back nail-beds and feet are the vital places, where oil administration is indicated in this ballad. Another ballad of the great twin heroes, Koti-Chennaya in coastal Karnataka explains some detergents used for washing the body during a bath. The flour of black or green gram, soapnut, and bark of *Albizia lebbeck Benth* (*bage*) and mucilageous plant extracts are the common detergents.

Ardala (*haritāla*; arsenic compound), gopi (clay), vermilion, charcoal, sandal paste, red sandal paste, or cow-dung ash is applied on the face and forehead or body as a mark of religious code. Collyrium and *kajal* are prepared domestically and applied to eyelids. Hindu women adorn flowers overhead and men adorn tulsi(*Ocimum sanctum* L.) or bilva(*Aegle marmelos* Corr.) over their ears. Betel leaves, with lime and areca fruit pieces are chewed after food. Camphor, clove and cardamom are often added to it for proper salivation and mouth fragrance.

Physical fitness

Sōryanamaskāra (offering prayers to the Sun) comprising major yogic physical postures is done by people mostly on Sundays, and they fast till they finish these exercises. *Prāṇāyama* is an important part of yogic exercise in which one inhales fresh air to the maximum capacity through one's nostril, holds it for a while and exhales it through the other nostril, practising deep expiration. Normally, this is practised 10 to 20 times. Such simple exercises relax and refresh the body and mind. Orthodox Brahmins practise this twice a day during their *sandhyā vandana* or daily penance. Meditation is a mental exericse in which mind is directed inwardly to think, after closing external sensory organs. By constant practice, it regulates many involuntary vital functions of the body such as heart-beat, digestion, oxygenation of blood and the like. In India, all religions stress the importance of meditation.

Various martial arts are taught and practised in many parts of India. However, some of them are found in ritual form like *Karaga,* which is celebrated in parts of Tamil Nadu and in Karnataka. Gameball play (*cenḍāṭa*) at Polali in coastal Karnataka is another example. The ball is made up of leather and actually weighs over 10 kgs. *Kalari* and

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talimbu are the other arts of Kerala and Karnataka. Wrestling is still practised in every village of India. Wrestlers learn the art from the *Ustād*(master), who teaches not only wrestling techniques, but also prescribes food, regimen and codes of conduct. Management of trauma, fractures and injuries are also known to the *Ustād.* Archery is still taught among tribals of Assam, Bihar and Orissa. Game hunting has remained in the form of ritual in many parts of India.

Folk games like *Kabaḍḍi* or *Tu Tu* are popular all over India. *Kho-Kho* and *Mallakaṃba* are very popular games in Maharashtra. *Kaṃbala* (buffalo race), bullock race in Tamil Nadu, and the sport of rowing in Kerala are still in vogue. The racers require good physical stamina and will-power. *Aṅka(stick* fight) and *Appangayi*(passing the coconut) are, however, the two vanishing village games of South Canara district in Karnataka.

Indian classical dances involve a good deal of physical exercises. Kathak, Kūcipudi and Bharatanāṭyaṃ are taught in vigorous ways. Many folk dances in India prevail in family traditions, which involve good physique and body flexibility. *Kīlu kudure, Nandi Kamba, Viragāse, Pata, Ḍollu* and *Yakṣagāna* in Karnataka, *Kathakkali* and *Terakkuṭṭu* in Kerala, *Ramalila* and *Dandiya* in North India are some examples of folk dances.

Food and nutrition

There is no human society that does not have food beliefs and practices, which are either beneficial or harmful. In all societies around the globe, food behaviour has always been surrounded by a wide range of beliefs and practices, likes and dislikes, and many other values emanating from customs and attitudes. Food has been playing a remarkable role in practically all social and religious happenings in a society. It has helped in the maintenance of family and kinship bonds and ties, thereby fostering group loyalty and solidarity. Every community evolves its own distinct pattern of food production, distribution and consumption (Kakar, 1977).

Indians consume and utilize the available foods in response to various socio-economic, religious and cultural compulsions. As a consequence, certain foods of high nutritive values, though available in plenty, are not fully utilized by them. Also, certain foods which are considered good in normal situations, are specifically prohibited during pregnancy, lactation and some illnesses. For example, papaya and pineapple are forbidden in pregnancy, and fish is avoided by patients suffering from skin disease. Often, foods are regarded as *hot* or *cold*. Onion, garlic, bitter gourd, drumstick and gingily seeds are considered hot, and believed to cause early onset of puberty. Mango fruits are considered to be hot, but banana as cold. Adolescent boys eat bananas to prevent nocturnal emission of semen. Certain foods are considered as health-giving, health-promotive, health-destructive, blood-forming and blood-vitiating. Milk, clarified butter and curds are regarded as health-giving, health-promotive and consumed daily. The tender palmnuts of palmyra palm (*Borassus flabellifier*) are not eaten by all people in South India although they are available in plenty. It is considered to be disease- causing and un-wholesome. Beetroot and tomatoes, have blood-forming virtues, but fish, oil-fried dishes and brinjals have blood vitiating properties.

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Basically, no human group eats all potentially edible material available to it, but arbitrarily classifies these into food and non-food items. Although dog is a source of animal protein, it is categorized as 'non-food' in the USA. Even if fish is available to Tanzanians who are hard-pressed for food, they do not eat it. Most Hindus in India avoid beef, and Muslims avoid pork (Kakar, 1977). Ritual and religion based food and non-food categorisation is deep-rooted in the Indian societies. *Manusmṛti,* a text on human conduct and morality (100 AD), forbids the use of mushrooms, onions and garlic. Priestly Brahmins do not eat these foods. Besides, many vegetables and fruits like cabbage, cauliflower, beet roots, carrot, papaya and apple are not eaten by them since these are non-indigenous in origin.

Makki-di-roṭi and *sāg khīr* are the cultural supper foods in the Punjab in north India. *Poṅgal* is a special food in south India. Various sweets and cooked rice and vegetable items are served in ceremonies and mass feedings all over India. Particular types of vegetables are reserved for death rites and ceremonies. They are forbidden during auspicious social events like marriages, naming ceremony, etc.

There are certain firm opinions about each food item, regarding its 'hot' or 'cold' nature. This is an inherent property of the food, and not related to the temperature or piquancy. Pregnant, lactating women and sick people are selective in choosing food articles. The following are a few popular beliefs—related to food prescriptions

* Diarrhoea is a 'hot' illness, and 'hot' foods are to be avoided;
* Eggs, mutton and fish are 'hot' foods, and forbidden to persons with weak digestive system and pregnant and lactating women;
* Solid foods are to be avoided in fever, diarrhoea and dysentery;
* In the third semester of pregnancy, food intake should be reduced to avoid the birth of large-sized baby;
* Whole milk and solid foods before teething in infants cause digestive problems;
* Curds are to be avoided for dinner, but butter milk can be consumed;
* Clarified butter increases vigour, energy, and mental alertness;
* Old food grains have higher nutritive values than fresh ones;
* Cow milk is more wholesome than buffalo milk;
* Drops of donkey's milk impart immunity to infants.

Breach of taboos would affect human life in several ways, according to various beliefs in India. A man suffering from opthalmia should not comb hair. A healthy person should not gaze in order to avoid the disease. One should not eat gooseberry fruits till the celebration of a ceremony called *Uttāna dvādaśi*. A person who spits into a stagnant pool will get mouth sores, and if he defecates he will get sores in his private parts. One should not kill a cat or a frog. If he kills them, he may suffer from tremors like Parkinson's disease. However, once the cause is discovered, a confession, a sacrifice or propitiation of the offended spirit of god is very much needed to bring about the cure, according to folk belief.

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Diagnostic tools

The concepts of diagnosis, prognosis, etiology, materia medica and therapies have regional colloquial terminology in the context of regional variations. Diagnosis of any disease begins with thorough interrogation of patients by the folk medical men. Among Santals, after the preliminary inquires, the medical man (*ojha*) looks at the patient's face,and also feels the patient's pulse (*nāḍi)*. A good Santhal *ojha* is said to have mastered over 23 different types of pulse examinations in each of the arm. 20 types of pulses have been described by a medical philosopher, *Vaidya* Sanganna (1400 AD), who belonged to Karnataka. They are as follows: *mayūra nāḍī, maṇḍūka nāḍī, jaluka nāḍī, ahivali nāḍī, maṇḍalagamaka nāḍī, sadeta patha nāḍī, pūrva nāḍī, paścima nāḍī, gajagamana nāḍī, haccottu nāḍī, vikrama nāḍī, sūtra nāḍī, saneu nāḍī, sañcala nāḍī,śaitya nāḍī, uṣṇa nāḍī,karkotaka nāḍī, samarasa nāḍī, and santoṣa nāḍī.* Fits, ulcer, respiratory infections, asthma, arthritis, and venereal diseases are claimed to be diagnosed through *nāḍī* examination. The span of life, healthy and diseased constitution of individuals, are predicted by expert nāḍī examiners. Pulse examination is usually taught and learnt through the oral tradition. Inspection, interrogation as well as physical examination are generally undertaken by folk healers. For example, in the case of snake bites, a healer takes a sharp pin and goes on pricking the affected limb. He diagnoses the extent to which the venom has spread in the body, and where the pin prick is not felt by the victim. He also observes the bite mark, colour of blood, victim's general conditions like respiration and responses. Special investigations are sometimes undertaken to diagnose the diseases. The victim's urine is collected in a vessel, and seeds of horsegram are soaked overnight in it. If the seeds do not sprout, it is diagnostically concluded that the victim is suffering from *nasan (kaimaddu)* poisoning. Another test is also conducted. The juice of drumstick (*Moringa olifera L*) leaves is prepared, and the victim should hold it over his bare palm for five to ten minutes. If it gets curdled up, it is believed that victim has been poisoned, and even his sweat may have poisonous effects. Butter smear test is the third one to diagnose poisoning. Thick butter paste is smeared over the umbilicus of the suspected victim. If butter gets dissolved due to the warmth of the abdomen, it is understood that the person is healthy. Otherwise, he is suffering from *nasan.*

Imposition of strict diet and regimen is a common phenomenon. Mostly, the tradition flows in families for generations. The secrecy of the healing art is guarded safely, which is considered to be God's gift. Herbalists, who mercifully serve the poor and needy exhibit high moral and professional ethics. The services are either free or with nominal or token fees.

Hot and cold theories

Hot and cold represent two opposite states, and the ideal is a balance between the two. A state of balance is conducive to maintaining good health, while imbalance leads to disease. An individual goes out of balance through changes resulting from excess of hot or cold affecting the body, and the restoration of balance by means of the opposite or

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similar, as relevant, also involves change. Hot or cold are therefore processes, whose actions presuppose change, and balance is a state of dynamic equilibrium.

There are two main ways by which an individual is exposed to hot and cold. One is internal, through daily consumption of food and beverages, the other is external, a result of physical activities including exposure to the elements. In the case of food and beverages, the two categories would be taken into account both in their preparation and consumption, if relevant knowledge and interest exist and the availability the food allows for the necessary choices. The classification of foods can extend to extremes of very hot and very cold, or more modified and intermediate (temperate), including substances which do not have any real or known intrinsic hot-cold effect. An excess of *hot* food (not in the sense of temperature or taste, though this can be an added factor) will result in fever, while too much cold food leads to general debility. These states would be regarded as having a direct relationship to diet; but corrective measures would include the withdrawal of certain foods and inclusion of some of the opposite kind.

In the second case, heating and cooling are the result of physical factors, the element of temperature being relevant. Exposure to heat at work or to the sun may overheat the body, and working in the cold or in water, exposure to cold air and wind when hot, will result in a chill or cold. In both cases, there may be clear-cut symptoms indicating whether the condition is hot or cold, but there may be symptoms common to both. In such cases, therapy aims at restoring the balance by using foods and remedies of opposite or similar types as indicated. Such measures may require the use of more specific remedies, mainly herbal. Treatment for hot-cold beyond the home treatment or self-care level becomes the responsibility of the indigenous herbalist.

The picture may not always be so clear-cut. Though illness may still be categorized as hot or cold, its origin may be considered as being supernatural. It will then require the services of a diviner to elucidate, and special rituals for treatment. Hot and cold are part of a spectrum embracing the over-all belief system—causation of disease, the non-material forces at play in daily life, ranging from individual emotions and actions to the evil eye, and the work of malefic spirits, and generally man's inter-relationship with nature and universe.

One must first know how to classify all the foods, plants, mineral and other substances into the appropriate category—hot, cold (very hot or very cold) or temperate. This is to be not only learnt as fact, but also reinforced by direct experience. Classification has been found to vary in different areas, and the inclusion of recently manufactured items does not appear to follow a consistent pattern. It has hitherto been difficult, therefore, to establish how substances are allocated to one or the other category, other than on an empirical basis.

In any case, *hot* and *cold* therapy is one among the common modes of therapy in folk medicine, with some logic of its own. *Hot* food and remedial recipes are used for alleviating diseases caused by heat. Driving, working under the sun, any physical labour, keeping awake at night hours, too much drinking of coffee, tea, alcohol and smoking, are a few examples of heat-causing factors to the body. Due to the heat, the body tissues like blood, semen, etc. become vitiated. Liver and urinary tract get involved. Many other

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diseases also manifest themselves. Patients may get sore eyes, buring micturition, constipated bowels, sleeplessness, and also diseases like jaundice, fever, boils, and abscess, bleeding piles and gastric or duodenal ulcers. Too much exposure to rain, cold, dampness, wind, severe cold weather, cold water bath and certain cold foods cause respiratory complaints like rhinitis, bronchitis, sinusitis, and sore throat. They may also produce another category of cold diseases, including illness resulting from air. Internal cold toxins combine with bad air which culminates in paralysis, rheumatism, pleurisy and tuberculosis. Women during the post-natal period are specially guarded against cold. This strict and vigilant care prevents cold diseases.

At Hyderabad, the capital of Andhra Pradesh, a Goud family distributes free medicine for asthma and bronchitis even now. The medicine is administered only on the day the sun enters the star *Mṛgaśirā,* which normally falls on either June 7 or 8, every year. A little herbal medicine is being put into a tiny living fish, and shoved into the gullet of the patient. Fish is believed to be a heat-generating agent. The sudden transition from the hot *Rohiṇī* month to the showers of *Mṛgaśirā* brings with it sudden constitutional changes in the human body. To counter this, there arose a belief that fish eaten on the first day of the monsoon season would protect the body against coughs and colds.

THERAPISTS AND THERAPIES

Herbalists

Current folk therapists can be grouped under a large group of herbalists. Folkloric oral-healing tradition is prevalent among herbalists practically in every part of India. Besides, herbalists have a dominating role in rural health care. Since the basic texts of Ayurveda are in Sanskrit, the influence of Ayurveda upon folk medicine is almost negligible. Futher, the herbalist culture in India is different from its European counterpart in several respects.

In the *Caraka Saṃhitās,* the number of plant, animal and mineral drugs described are 341, 177 and 64, respectively; in the *Suśruta Saṃhitā,* it is 396, 57 and 64, respectively. On the other hand, in folk therapy, as many as 4600 plants drugs, over 210 animal and 110 mineral drugs, are employed.

Minutely administered animal steroids like those of ox bile, musk, ambergris and civet are highly praised and priced. But the efficacy of the raw, green herb is superior. Single or compound drug remedy is chosen by herbalists, according to the nature of the disease and the constitution of a patient. In the folk tradition, herbs are often worshipped before plucking. Poisonous plants, mineral and animal products, are carefully processed to 'purify' them. Bitter and purgative remedies are always sought after by people.

The 'Laws of Signature' are those which are distinctly seen in the herbalist's pharmacology. These laws exist both in the codified and the non-codified healing systems of the world. The old theory of the 'doctrine of singnatures' held its ground till comparatively modern times. It is supposed that plants and minerals indicated by them in the external characteristics of the diseases, for which the nature had intended them as

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remedies (Burnel,S.), are simple but logical. Nature indicates the uses of particular substances in particular ailments. The human body-shaped roots in ginseng is the best example. Aerial roots of the banyan tree are processed in oil, and applied to promote luxurious hair growth. *Vitis quadrangularis L.* (*hadjod*) stems are like bone joints, and are used in cementing fractures in India. Horse urine-like smelling *aśvagandha* is used for promoting strength and vigour. Red flowers of *Butea frondosa L.* (*palāśa*) are used for increasing blood. *Cuscuta sp.* are thread-like plants used in the cure of helminthiasis. A plant growing near water like *Saccharum munja Roxb, Imperata cylindrica L.* (*darbha*) and sugarcane are used as a diuretic. The use of yellow barked *Morinda tomentosa Heyn.ex Roth.* in jaundice, and swollen stalked *Acampe premorosa B. Latter and McCann,* in glandular swellings, are the two classical evidences suggesting the 'Law of Signatuers'. The goat is a very active animal, hence its milk is considered to promote activeness in the body if consumed by human beings. Redochre is used for coagulating excess vaginal discharge in women. Quicksilver (mercury) is considered the semen of Lord Siva. The worship and use of it in any form are regarded as health-promoting.

It may be noted that green and dry plant materials and some mineral raw materials are sold in the market. Presently, the non-availability of herbs due to deforestation is causing a major set-back to the herbalist's profession.

Other major groups of folk therapists include:

Single disease therapists

The Herbalist whose speciality area is limited to single disease therapy like treatment of mania, jaundice, headache, paralysis and skin diseases.

Kitchen remedies

It is otherwise known as *gṛhavaidya* or *manemaddu* (Kannada), *gavthi cikitsā* (Hindi). Plant, animal, mineral products are used in therapy. The therapy is simple.

It does not require experts' advice. It is usually safer, and hit or miss method without any adverse effects. Mostly, the remedies are sought as first-aid. The 'drugs' or components of drugs belong to kitchen stores or kitchen gardens. Rarely, are they bought from dry drug-sellers. Head-aches, sore eyes, cough, cold, common fever, acidity, indigestion, pain abdomen, diarrhoea, dysentery, worm infections, scanty and burning urination, minor skin infections, fungal cutaneous disease, motion sickness, morning sickness in pregnancy, lactation problems, non-specific vaginal discharges, painful menstruation are commonly tackled problems through kitchen remedies. Cuts, burns, insect bites, are treated instantly through first-aid measures. Promotion of positive health is sought through 'tonic' food and herbs. Beauty and cosmetic care is also rendered through kitchen remedies. Old women or grandmothers are the common remedy-tellers. The knowledge flows only via an oral tradition. A few examples of home remedies are given here.

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Honey therapy: Honey is extensively used as a panacea for many ailments.

* Piper longum or Syzigium aromaticum powder with honey in bronchitis, cough.
* Ficus religiosa bark with honey in indigestion and acidity.
* Terminalia chebula fruit powder with honey and ghee for purgation.
* Barringtionia recemosa fruit paste with honey in stammering.
* Honey as a feed to new-born.
* Castor oil with honey for asthma.
* Coriander seed decoction with honey for asthma.
* Fried hot horsegram-dipped honey ear drop for ear-ache.
* Hot honey with ginger juice for ear-ache.
* Honey with rice corn flake in bluching.
* Honey application for burns and wounds.
* Citrus medica juice with honey in hiccup.
* Apium graveolens seeds powder with honey in chronic dysentery.
* Lemon, ginger juice with honey in vomitting and diarrhoea.
* Honey to increase memory and vigour.
* Honey with gooseberry fruit to enhance memory and vitality.
* Honey with buffalo milk and ragi flour in urinary calcul.
* Honey application over cracked nipples.
* Honey with the decoction of *Alstonia scholaris* bark in non-specific vaginal discharges.

First aid:

* Cuts and bleeding wounds: Paste of *Cassia tora, Ageratum conizoides* or *Eupatorium ayapana* leaf application.
* Foreign body thorn prick: application of old tamarind fruit pulp or latex of *Calotropis procera* and salt fomentation.
* Burns: Cold water bath, application of tamarind bark ash with castor oil and orally enough tender coconut water.
* Insect bites: Turmeric powder with leaf paste of lawsonia imemisa application or paste, application of petiole of cucum or melo fruit to the site of insect bite.

Gastro intestinal disorders:

Abdominal distension: Chewing betel leaves with coriander seeds. Fomentation through heated betel leaves. Application of castor oil or ghee around navel.

Tongue coating, apthal, stomatitis: Consuming fresh (6 hrs old), curds, green salads of coriander leaf or seed.

Indigestion: Fenugreek leaf salads, decoction of coriander seed, ginger and leaf of *Centella asiatica*.

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Dyspepsia: Chewing of *Jasminum grandiflorum* tender shoots.

Diarrhoea: Bark paste or decoction of *Careya arborea* tree. Poppy seed with coconut milk or tea decoction. Banana flower decoction. *Acacia arabica* tender shoot chewing.

Dysentery: Achyranthers aspera leaf decoction. *Psidium guajava* tender shoot salad; fried fenugreek seed powder and hot rice with fresh butter milk, *Cassia tora* leaf juice with salt.

Piles: Leaf of the drum stick and *Calotropis procera* latex with honey application to the growth. Leaf of *Achyranthes aspera*, pepper, lime water, soup of garcinia indica fruit peel (kokam).

Constipation: Dried banana cake eating; sour curds with molasses; sour curds with sugar and salt; warm milk with ghee and butter.

Respiratory disorders

Chronic cold: Root paste of *Emhelia* ribes with lemon juice, butter milk and molasses; betel leaf stalks (8-10) crushed and put in warm milk and sugar;

Cough: boiling rice water with molasses; bark decoction of the ficus racemosa tree with milk and molasses; black gingilly seed with black gram flour pudding.

Hiccup: Inhalation of fragrance of either *jasmine, red jasmine,* or *campaka* flower.

Bronchitis asthma: Cassia tora leaf, seed with honey; leaf juice of *Adatoda vasica* with pepper.

Urino genital tract problems: Cold infusion of *Ocimum basilcum* seed or rose petals; leaf juice of Colens aromaticus or use of it daily as food, white petal shoeflower leaf and rice in the form of pudding (dosa); coriander seed with tender coconut water.

Non specific vaginal discharge: (white) *Aloe vera* leaf pulp with candy sugar.

Red discharge: Mimosa pudica leaf paste orally with milk; *Adatoda vasica* leaf juice with honey; bitter gourd leaf juice with honey paste of black gingilly seed with pimpenella anisum seed soaked in milk; tender shoot of *Saraca asoka* with honey.

Skin disorders

Whitlow: Keeping of infected finger in the nostril of buffalo calf for 10 minutes; application of paste of *Tabernaemontana coronaria* leaf paste with sandal.

Toe infection: Application of teak shoot paste.

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Scabies: Sandal paste with curds applications.

Boils: Tender papaya fruit paste.

Corn: Cassiatora leaf paste or latex of *Nerium odorum* application, followed by hot fomentation of *Erythrina indica* leaf.

Acne: application of *Bombax cieba* bark paste or coconut milk with tumeric or *gmelina arbona* bark paste.

***Cosmetic, beauty care*:**

Kumkum dermatitis: Henna leaf application.

Dandruff: Flower buds of shoe flower processed in gingilly oil application.

Hair care: Shampooing of shoe flower leaf, gingilly leaf, regular massage of coconut oil, castor oil, bathing with powder of *Acacia concinna* pod.

Helminthic infections: (worms): Mango kernel paste, juice of *Artemissia vulgaris* leaf with butter milk, castor oil, papaya seed powder, bitter gourd leaf juice, pomegranate bark juice with honey.

Head ache: Fomentation with betel leaf to forehead coconut milk, and cow's milk applications to scalp.

Tooth ache: Ocimum sanctum leaf with pepper filling or baking soda filling.

Kitchen remedy tellers

Elderly women judiciously combine household spices and culinary herbs to prepare medicines for curing minor ailments.

Bone setters and Osteopaths

Fights and accidents cause fractures and dislocation of limbs. Traditional osteopaths possess skills of bone-setting, which is mostly inherited and rarely self-acquired. Indian traditional osteopaths are known for their expertise and manipulative techniques. The management of fractures, dislocations and soft tissue injury are handled by them. Open wounds are first healed. The affected limb is manipulated and properly set. The traditional fracture-healing herbal mixture is spread over a piece of new cloth, and the fractured limb is wrapped tightly using anointed cloth or paper, sometimes belladonna plaster. Wooden, bamboo or arecanut leaf stalk pieces are also used as splint to support the cloth bandage in between. Bones are set by three or four weekly sittings. Crude methods of putting traction to set right malunited bone ends and shortened limbs are also undertaken by some osteopaths. Nourishing diet like chick cooked with ghee or sweetened rice porridge

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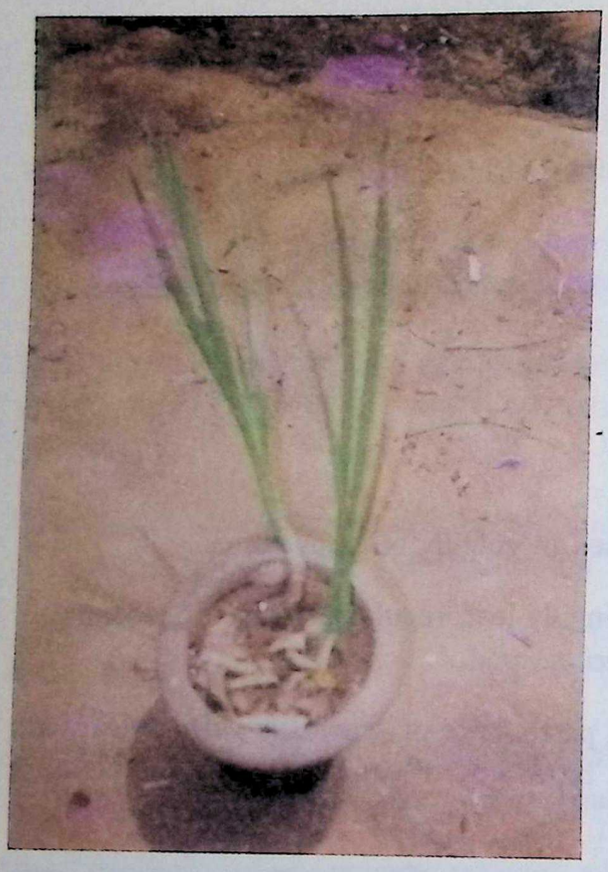

Fig. 1. *Plant Vacā, Acorus calamus L.*, roots of which given in small doses ground with honey to new borns to improve vocabulary.

Fig. 2. From folklore to fame, wonderdrug 'Cotacand' (Rauvolfia serpentina Benth ex Kurz) used for curing hypertension and mania.

Fig. 3. Driving out the epidemic disease from the village in the form of driving away the disease-causing evil spirit *māri*, a concept of community medicine. (Wooden idol of *māri* is seen in the picture).

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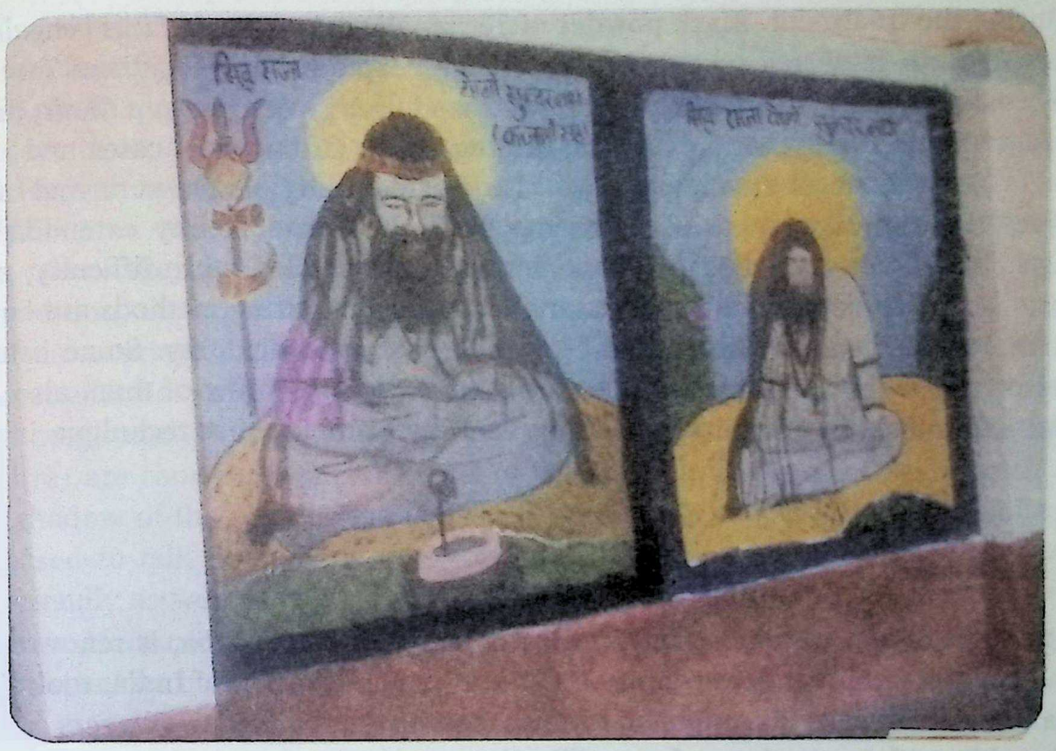

Figs. 4 (above) & 5 (below). Wall drawings of Nātha Siddhas, the spiritual healers and alchemists of the medieval period, in a remote village in interior South Karnataka.

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is fed during the treatment. Black powder of *Terminalia arjuna Roxb, Ficus bengalensis L.*, or *Ficus religosa L.* is dusted on the open wounds for rapid healing. Leaves of *Tamarindus indica L.,cassia auriculate L., Dodonaea viscosa L.,*and of *Argyria aggregata Chois*, are some of the ingredients for preparing fracture-healing paste. Orthopaedic cases and cases of paraplegia as well as of hemiplegia are also treated using acupressure and massage techniques. Perambulatory cases utilize the make-shift ward facility extended by the herbalists. Skull, vertebral and hip bone fractures are tackled with difficulty, and the prognosis is said to be none-too-satisfactory. Human bone-setting methods are employed also in the case of cattle with a sound knowledge of their anatomy. Some osteopaths make efforts to learn anatomy by dissecting animal carcass. A few of them also acquire practical experience in animal bone-setting, and later employ that technique in human cases.

Snake bite healers

Healing of snake and venomous bite, indeed a practical art in India, is renowned since ages. Alexander the Great (4th century B.C.), during his invasion of India, took the help of Indian healers to save his armymen from snake-bite deaths. Indian villagers commonly encounter bites of centipedes, cobra, millipede, scorpion and vipers. Bite victims rarely approach modern medicinal doctors, since herbal healers treat thousands of bite cases, employing emesis, blood-letting, fomentation, local and oral medication. Besides, rapid success is also assured to a cobra bite victim through charms and medication. Anaesthetised limbs, diplopia, gum-bleeding, thickening of tongue, and unconsciousness are the complicating signs in snake bite. A healer takes careful account of all the signs and symptoms, and employs accurate and precise methods to handle the situation. He also treats viper-bite, which causes gangrene and which needs prolonged treatment, to revive the tissues. Snake-bitten cattle cases are also handled.

The following plants are generally used for healing venomous bites:

Abrus prectorius L; Achyranthes aspera L; Alangium salvifolium (L.,) Wang; Areca catechu L; Artstolochia indica L; Andrographis paniculata, Nees; Aquillaria agallocha Roxb; Barringtonia recemosa Roxb; Cassia fistula L; Cedrus deodara (Roxb.) Loud; Clerodendrum serratum (L.) Moon; Corollocarpus epigaeus Benth ex Hook.F; Crotalaria retusa L; Cyclea arnottii, Miers; Cynodon dactylon pers; Euphorbia tirucalli L; Evolvulus alsinoides L; Holarrhena antidysenterica Wall; Holoptelia integrifolia Planch; Lagenaria siceraria Stand; Leucas cephalotes Spreng; Olea dioica Roxb; Piper nigrum L; Pongamia pinnata Pierre; Randia spinosa poir; Rauwolfia serpentina Benth. ex Kurz; Sanatalum album L; Sapindus trifoliatus L; Saussurea lappa C.B. Clarke; Strychnos nux-vomica L; Tabernaemontana coronaria, R.Br; Tamarindus indica L; Tephrosia purpurea pers; Tinospora cordifolia Miers; Toddalia asiatica Lam; Tylophora indica Merril; and *Withania somnifera Dunal.*

Common code of conduct for folk Herbalists

Folk herbalists rigorously observe certain code of conduct as follows: they do not eat food in the households where death occurs till the mourning period (13 days) is over; do not

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continue eating if lights go off, during dinner time, and fast till next morning; do not urinate in standing posture; will rush to the spot of the diseased soon after the summons; fast on days of lunar and solar eclipse; medicinal herbs used by them are touched on Dipavali festival day; the name of medicinal herbs are memorized on the days of new moon, full moon and eclipse: and they dispense medicines only on Thursdays and Sundays, unless they are full-time practitioners.

In addition, there are codes for the collection of medicinal herbs also.

The plants are worshipped before collection; diseased plant parts are not collected; plant material is not collected which grows near a graveyard or anthill unless it is used for black magic;early hours of morning and particular lunar constellations (like Aśvinī, Hastā, Citrā) are chosen for the collection of the plants; collection is done in such a way that the shadow of the person who collects it does not fall on the plant; the collector is not supposed to talk to anybody till he collects the materials; and the collector of the plant is friendly as well as conservative in collecting only after. A proverb in this regard is as follows: *Māra noḍi cekke eṭṭu* (Kannada). It means that looking at the size of the tree should one peel its bark.

Minerals in medicine

Gold, silver, iron and copper were known to Indians in the Vedic period. Carefully processed gold was orally used in the form of medicines to achieve tonic effects in this period. Descriptive verses on the medicinal uses of silver, copper, lead, tin and iron are found in the *Samhitās* of *Caraka* and *Suśruta*. Medicinal uses of other minerals like copper sulphate, iron sulphate, realgar, orpiment and sulphur, singly or combined with plant drugs, are found in the *Raśāsastra* texts. Elaborately processed mercury was used to cure obstinate skin diseases.

Nagarjuna, regarded as the founder of Indian alchemy, was well-known for his alchemical and transcendental experiments. The body transforming branch of alchemy, iatrochemistry (medicinal chemistry), which gained strong roots in India after the tenth century A.D. The *Rasārṇava* and the the *Rasaratnasamuccaya* are among the important texts on mineral medicines. In course of time, minute doses of mineral medicine excelled herbal therapy in India, though the incinerating methods of metals and non-metals were too elaborate and expensive. Iatrochemistry, which is closely interwoven with transmuting techniques, naturally became a big secret. But, gradually, coded secret knowledge of Indian alchemy went into oblivion, and mineral medicines began to be produced with diligent care for use to cure certain types of ailments.

Mineral medicine in the present era

Indigenous drug-manufacturing companies produce single and compound herbo mineral drugs. Mineral ashes and compounds are seldom prepared by folk therapists, but often prescribed. Folk therapists rarely conduct transmutation experiments secretly. A Kannada

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proverb—*vāda bhraṣṭa, vaidya śreṣṭn* (transmutation experiment is ruining, and iatrochemical medicine is great)—depicts the social curb over the transmutation. Many healers speak highly of a herbo-mineral solid called *Kuppi kaṭṭu mātre* (black heavy bolus, probably made of mercury and other minerals and herbs). Making or using of *kuppi matre* is not known now, while such bolus used in microdoses was considered as the panacea in the past.

Traditional midwifery

Every society provides a system of ideas and behaviour for coping with the life crisis of childbirth, and this system included patterned set of beliefs and practices concerning pregnancy, delivery and puerperism. It is indeed significant to note that over two-thirds of births in the world are delivered by local or traditional midwives or birth attendants, who are not trained in Western or cosmopolitan medicine but rather in the traditional system of delivery. In rural areas, they are the only source of assistance and care, and deliver over 90% of the births. Indians call them *dai* and Egyptians *daya*. The term traditional birth attendants or TBA is used by W.H.O., and is defined as a person who assists the mother at childbirth and who initially had acquired her skills for delivering babies by herself or by working with other TBAs, whereas the term midwife is used to refer to a person with formal medical education who is officially registered or licensed. TBAs also often provide pre-natal and post-natal care and treat maternal and child illness. The pregnant and post-partum women are subjected to a variety of dietary and behavioural restrictions and prescriptions, which are based on the equilibrium principle and are viewed as preventive as well as therapeutic. For example, a post partum mother is often considered to be in a *cold* state because of the loss of blood (which is *hot*) and must take precautions to avoid cold influences. These precautions may include seclusion, keeping her head covered, not bathing, not eating cold substances, but rather eating or drinking 'hot' foods and medicines. Cold foods will also make the breast milk cold and nursing baby ill. The concept of heat could be used to teach concepts of asepsis and hygienic practices. The use of boiled water and disinfectants could be viewed in terms of heat, counteracting the harmful effects of cold. The germ theory could be incorporated within this framework, and might be more acceptable in such terms.

An extension of the equilibrium principle is the balance of emotions and one's social relations. A common belief is that strong emotions, such as anger and fright, should be avoided during ante-natal and post-natal periods since they upset the body's equilibrium and thus cause complications which include premature birth, miscarriage, retained placenta and cessation of milk. Emotional stress might contribute to a difficult or complicated birth, whereas lack of such stress is beneficial. Stress avoidance is an element of preventive medicine in these rather holistic health systems. The body is a medium used for expressing particular patterns of social relations. Since most incidents of anger or other stressful emotions involve conflict or change in social relations, the disturbed equilibrium of the social environment must be restored for proper health of the mother and child. The imbalance caused by pregnant and post-partum states is viewed as

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dangerous and polluted condition. Blood is considered an unclean substance, and consequently menstruating, pregnant or newly delivered women should avoid people, cattle or crop. Most traditional midwives are middle-aged or elderly women.

The relationship between the traditional midwife and her client is usually personalized, informal, supportive, and holistic, in contrast to the depersonalised, formal, authoritarian and segmented characteristics of child-birth that one notices today. 'Personalized' means that the midwife usually knows the client and her family, visits her, and operates in an atmosphere of confidence and trust. The traditional midwife is concerned not only with the biological aspects of the birth process, but also with the woman's emotional life, family relations and spiritual life. During the different phases of child-birth, in respect of pregnant women, care is consistent rather than segmented. Childbirth is frequently regarded as a dangerous period, with both mother and infant susceptible to physical and spiritual harm. Protective rituals, some performed by the traditional midwife, may include prayers, lighting candles, burning incense, animal sacrifices, herbal baths, wearing amulets, and eating special foods.

Recruitment and training: The reasons for becoming a traditional midwife include inheritance from a female relative or a supernatural calling, dream experience, or a personal decision. Inheritance is the most commonly reported path of recruitment. A variation of the inheritance pattern where *dāi* comes from the lowest castes, the caste membership is inherited.

Accountability of a *dāi* is often believed to be to God or to some supernatural force. That is, the traditional midwife may believe that the outcome of the birth is in God's hands, and that she is only His agent. However, she is also accountable to the community, as a member of which she is also exposed to various social pressures and sanctions. Her reputation, and consequently the number of her clients, will be influenced by her manner and treatment of them as well as by the number of successful deliveries.

Pre-natal care: The amount as well as the type of pre-natal care varies widely. The traditional midwife may be required to examine the woman at any time during pregnancy, the most frequently reported times being between the fifth and seventh months. The pre-natal examination usually begins with an informal visit, during which inquires are made concerning the health of the mother and her family. Pre-natal examinations as well as the actual delivery are performed in accordance with local standards of modesty. Often, the woman is fully dressed, exposing only the area for massage or examination. Herbal teas and baths may be administered to the pregnant woman to ease pains, to 'heat', fortify, and protect her. Traditional midwives often provide advice on diet and activity, reminding the pregnant woman of the various prescriptions, which are intended to guard her against spiritual and physical dangers. Food cravings should be satisfied, as it is believed by many groups that the denial of such cravings would result in either deformation of the baby or miscarriage. Traditional midwives are often called in if a miscarriage is suspected, and may administer herbal infusions or plasters to prevent miscarriages.

Delivery: A majority of births, especially in the rural areas, are domiciliary, with the traditional midwife coming to the mother's home. In some parts of India, birth is secretive,

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the house is shut, and the woman is not supposed to cry out, since her shouting or crying is disapproved. No admiration or compliments are given after the birth for fear of attracting the evil eye. In a few societies, however, birth is more communal; there is no seclusion, and relatives and neighbours may attend. The emotional and social support is given at the time of parturition, is provided by the traditional midwives, and is probably important in allaying anxiety; whereas, in hospital deliveries, the woman is usually isolated from her family.

In the Punjab, a particular type of manipulation known as 'healing' is reported. The midwife exerts pressure and counter action for each labour pain, with her feet on either side of the birth canal. The midwife also lubricates the vaginal canal with clarified butter or oil.

It is interesting to note that in cases of prolonged or difficult labour, various traditional techniques are used to induce gagging or contraction of muscles, such as putting the woman's braid in her mouth, puting fingers down her throat, using snuff, to make her sneeze, giving her oil to drink, and making her blow into a bottle. Unlocking bolts and locks, opening drawers, untying the mother's hair, or using charms made from moults of animals, are the other techniques based on sympathetic magic that might be employed to hasten labour. The traditional midwife may also perform rituals, say prayers, and listen to confession. A *shaman* or diviner is sometimes consulted to divine the cause of the difficulty, which may be attributed to adultery (usually blamed on the mother) or to witchcraft, and to perform an appropriate ceremony. Shaking the mother or other rogue treatment is reported in some groups for dealing with difficult or prolonged labour. Traditional midwives usually deal with abnormal presentations by external manipulation of the foetus. If a part of a body is extended, they first push it back inside with lubrication. Rarely do they attempt internal manipulation.

The placenta and umbilical cord: For delivery, the cutting tools include bamboo, shell, broken glass, knife, sickle, trowel, razor and scissors. These are, however, rarely cleaned in an antiseptic manner before their use. Dressing of the cord includes the use of substances like salt, talcum, spider webs, and a variety of herbs. The umbilical cord is usually tied with thread, string, or plant fibre, of a specfic length, which varies widely. Certain signs of the mother's future such as the number and spacing of children are also predicted by carefully observing the cord. Because the placenta is often believed to affect the future of the child, its disposal is important. The placenta and the cord are usually buried into the earth. Sometimes, the cord is guarded and used in some types of medicines. To avoid this possibility, the placenta and the cord could be given to the mother or husband to dispose of as they wish.

For a retained placenta, many of the practices and techniques are the same as those that are used for delayed labour-massage, gagging and administration of herbal teas. Manual extraction of the placenta is done very rarely. In the case of animals, after delivery, although an animal craves to eat its placenta, it is not allowed. People believe that such an act diminishes milk yield.

Treatment of the new born: The baby's eyes are wiped with cotton or rag, which is treated with a minute drop of lemon juice, oil, onion, boric acid, zinc oxide, silver nitrate, or

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patented eye drops. *Kājal* is put round the eyes, which is believed to strengthen them. Purgatives are sometimes administered to clean the meconium. If the baby is not given the colostrum of the mother, substitute liquids such as sugar water or water with anise or some herbal extracts may be given for the first two or three days until the mother's milk begins to flow. The traditional midwife may clear the baby's throat and nose of mucus and blood with her fingers, which could be the source of infection. The new-born baby may be cleaned with oil or washed in lukewarm water. Usually, the midwife visits and checks the umbilicus several times during the first week or until the cord drops. Some amulets might be used, and the midwife may perform various rituals to protect the baby from illnesses such as those inducted by an evil eye. Sometimes, the baby's head, nose and limbs are shaped by binding and manipulation. Swaddling of the infant is very common. When it becomes necessary, the baby is wrapped in several layers of covers in order to keep it warm, with the result that it sweats from being over-heated.

Post-partum treatment of the mother: Alcohol, salt, and various herbs are sometimes used to treat wounds of the birth canal and prevent infection. Massaging the abdominal area to ease afterbirth pains and cause retroflexion of the uterus is very common. Breasts are also massaged, as this is believed to stimulate the flow of milk. Special herbs or mixtures may be taken to increase milk flow. Herbal teas are also commonly administered as remedies for post-partum pains.

Contraception: Some means of traditionally practised contraception or birth control exist in most societies, although the specific measures vary widely in their effectiveness and rationale. The most widespread and reliable method is abstinence. This is often combined with certain taboo against sex and lactation, and this practice is based on the belief that intercourse or pregnancy will change the quality of mother's milk and make the infant sick or force it to be prematurely weaned. Prolonged breast-feeding by itself is said to suppress ovulation, which depends on a number of factors, including the frequency and the intensity of suckling.

Abstinence during special rituals or before certain activities such as hunting, or on specific days of the month, is practised in several societies. During *Aṣāḍha* (monsoon month), women were not allowed to meet their husbands in India. People believed that evil spirits would become strong in this season, and prevent conception of good progeny. Therefore, physical contacts with husbands were abandoned for one month. It is supported by beliefs that intercourse and semen loss would weaken, while conserving semen would be strengthening. Mechanical methods of contraception include the use of sheaths or condoms, which have been made out of animal skin, bladders and intestines as well aspessaries or obstructive plugs or caps placed over the cervix. Many indigenous plants are used for contraception. Most of these are taken as herbal teas, others are inserted vaginally or used as douches. Some of the plants may contain active principles that inhibit or neutralize gonadotrophic pituitary hormones. The traditional methods of contraception need scientific investigation.

Barrenness or infertility is an important concern among many women, especially in groups, where a woman's status depends on her having offspring. Infertility, traditionally

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attributed to the coolness of the womb, may be treated with heat, as in the form of a sweat-bath, and with 'hot' quality herbs, and the misplacement of organs is treated by massage; misbehaviour of the wife is treated with rituals and confession; for witchcraft or supernatural sanction, the treatment may involve pilgrimages to shrines (Shiela Cosminsky).

Human anatomy in Indian sculptures

Indian sculptors, then as now, had a picturesque knowledge of human anatomy, and this tradition is inherited. Small or big idols made of wood, soapstone or granite or marble which were, and are being, made by them have perfect or ideal proportions as far as their depiction is concerned body organs. The measurement used is known as *talamana* and with reference to this unit, of the idols, are cast or chiselled. Hindu temples and other places of worship are also built, keeping in mind the anatomical features of what is known as *Vāstu Puruṣa.*

Surgery and para-surgery

Vātsyāyana, the author of *Kāmasūtra* (erotic discourse), writes about the then prevalent practices of circumcision in the southern provinces; and has dealt with the perforation of the sexual organ, wound healing and bandage methods. However, there is a taboo in Indian Hindu society on circumcision, while Muslim moulvis(religious heads) conduct circumcision in boys of tender age. Coconut shell, stick, thread, cotton gauze and razor blades are the instruments used for it. Burnt rag, ash and butter are used for the healing of the wound as well as to prevent bleeding. *Jatropa curcas L.* latex, is also used as a healing agent.

Barbers were employed for traditional surgical operations. They were called *snāpita,* which means people who have taken their bath, because before touching any body they used to bathe. Bathing can be interpreted as an aseptic measure before conducting surgery. Hindus, however, consider barbers as outcastes. Still, their role in initiation ceremony (*upanayana*) and marriage is inevitable. Vedic texts indicate that the Asvini twins, who were the surgeons of Vedic times, were considered as outcaste since they conducted surgery—opening of the human body—touching blood, puss as well as cadaver. In any case, barbers belonged to the surgical school of healing inherited by Asvini twins in India.

In Kannada, *bhanḍari* and *haḍapad* are the two words used for barbers, since *bhandar* or *haḍapa* is a box containing instruments, and the term means a box containing surgical instruments. Till recently, they were mobile in nature. During a cock-fight, a game enjoyed specially by the villagers, the cock gets deep and lacerated wounds. Village barbers irrigate the wound with country-made alcohol and put sutures to the wound, so that the cock becomes fit again for the fight. Castration of the domestic bull is an act of village surgery. Two smooth, strong sticks are taken. The bull is made to lie with properly

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tied limbs, and sticks are rolled over the bulging testicles. Pain-relieving and wound-healing oils processed with medicinal herbs are then anointed over the testicles.

Tattooing: Kiḷḷekyāta and *Koravanji* are the classes of tribal women, who are skilled in laying tattoos in Karnataka—a source of their income. For this purpose, they prepare a herbal dye, and artistically prick the skin with 5 to 7 small needles together. The dye is also called *kappina rasa. Eclipta alba* Hassk (*garuga*), *Calamus rotang L.(hacee soppu), Alternanthera sessilis L.(hongone), Terrminalia chebula Retz.*(*anile*), and *Semecarpus anacardiam L.(geru)* are some of the plants used for preparing the dye. The liquid extract of the leaves of these plants is mixed with soot and breast milk. Images of Gods, and forms of sacred flowers and plants like Tulasi (*Ocimum sanctum L.),* scorpion, peacock or the name of the spouse are generally designed in tattoo marks. The dye applied to the tattooed skin will cause permanent dark or light green coloured designs at the places pricked. The laying of the tattoo is a ritual by itself. If a young maiden is chosen for tattooing, the process will be accompanied by singing. However, the singing diverts the attention, and the skilled needle-pricking sensation is not felt by the young maiden. Tattooing is at once a ritual, a means of erotic suggestion, and a cure for a disease like frigidity. It is believed that tattooing, (which may be allied in this respect to Chinese acupuncture) on some outer parts of the body, would effectively cure physical ailments like pain and inflammation and also certain forms of mental ailment. Perhaps tattooing on parts of the body like breasts and abdomen was a part of exciting the erotic urge of the husband. The pricking or puncturing is made with 3 or 5 or 7 needles simultaneously, which is similar to acupuncture. The injury thus caused takes about 2 to 3 weeks to heal.

Tattooing is nevertheless considered very auspicious. It is supposed to assist fertility, and hence barren women are specially induced to be tattooed. Tattoo mark on the forehead is a permanent mark of being a married woman, and such a woman is highly respected. Besides, tattoo enhances the beauty of the face and body. According to a tribal belief, the tattoo and blackened stained teeth(*hacce and hallukuppu*) accompany a dead person to the outer world. Tattoo, basically an art of parasurgery in the form of pricking and punching on the skin, is intended to stimulate vital forces in the body. Tattooing on the person is also regarded as a protective and curative procedure in various diseases. This art is prevalent among many tribes in India—the *Goṇḍas* and *Bhaigs*, and *Madiyas* of Bastar and Maharashtra, and *Kunci Koravas* in south and north Karnataka. However, the art is practised exclusively by the women-folk of the respective tribes (Krishnaiah.S.A.). In Bengal, various types of tattoos are practised as a cure for goitre. In South India, muscular aches and pains are sought to be relieved with the help of tattooing.

Other practices: Animal horns and pins are used to let bad vitiated blood, which is supposed to cause boils, itch and inflammation. Minor abscesses are opened at households using razor blades. Pieces of bangle, rhizome of *Curcuma longa* (*haldi)* and green stick of *Strychnos nuxvomica L* are ignited in red flame, and vital parts of the human body are cauterized. This method is exactly parallel to moxibustion of the Chinese system of medicine. Ginger, garlic, salt and onion are used in China for such therapy. The indication

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for moxibustion is mainly due to 'Xu-syndrome' as well as the cold syndrome. In India also, cautersation is undertaken in cold dysnosea (*eḷavu* in Kannada). Indian herbalists undertake cautery in healthy children too, with a view to inducing proper growth. Chinese moxibustion is also said to improve general health.

Divination and exorcism

Divination: Acquisition of knowledge of secret or future happenings by means of oracle, omens, astrology or from a presumed contact with superhuman or divine sources is known as the divination process. Dream analysis as well as of occult paranormal phenomena by S.Freud and C.G. Jung have revealed the existence of automatic non-verbal ways of thinking in analogies similar to those used by the inspired diviner. Research on trance, ecstatic phenomena and altered states of consciousness as well as recent anthropological and ethnological observation have conferred a certain respectability upon this form of knowledge, which is not based on cause and effect, but runs parallel to 'rational' knowledge. The secrets of the origin of disease, its course and prognosis, are supposed to be revealed through divination, which played a major role in diagnosis and treatment before the appearance of scientific medicine. Although this practice was swept away by the revolution of the industrialized countries, it is still enjoying a new wave of popularity.

In certain instances, it is difficult to distinguish divination from magical thinking. Some phenomena linked with magical thinking occur in certain psychological states, as described by 'scientific psychiatry'. Divination can thus be regarded as a technique used also in traditional medicine by people, who have been trained for employing it. Within the complex system of inter-relations between therapist, patient and environment, therapeutic divination may be defined accordingly as a practice. It makes it possible to call upon the 'super individual consciousness' by means of culturally codified technique for the purpose of interpreting the origin of a disease, indicating the remedies necessary for its treatment and predicting its course.

Exorcism: Exorcism plays an important part in the treatment of certain forms of illness, particularly the mental ones, in cultures, which have a dominant monotheistic religion. Religious or magical formulae pronounced by the exorcist may precede or accompany the ceremony or ritual. Toxic substances, beating, burning and tortures of all kinds may be meted out to the 'evil' through the intermediary of the possessed person. Though these extremely cruel practices are now disappearing, traces of them (in ritualised forms) are sometimes still found in traditional medicine all over the world amidst modern medicine. They are reflected in sayings like 'nasty medicine does good' and 'you must get worse before you get better', and the idea that illness is due to possession of the patient by evil or extended beings.

Exorcism is based on certain beliefs as well as some facts. Illness becomes the sign of conflict between the 'good' benign God and 'bad' wicked devil. The task of an exorcist-therapist is to restore order by casting out that which lies within the person, but which cannot for the time being be integrated into the society or culture he belongs to. The

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therapist employs practices which, in his belief, invoke the powers of good. But these may sometimes appear sadistic punishments. Exorcism plays an important part in particular forms of illness, specially those of mental origin. A priest-exorcist acts accordingly to drive away the evil spirits from the 'possessed' patient. The state of suffering by an individual from an illness, the cause of which is imcomprehensible to most of the people, is generally interpreted as histero-epilepsy. The commonest exorcism technique is to carry out ablution or aspersion of the patient with holy water. 'Possessed' people are taken to holy and sacred places for this purpose and given holy dips in rivers. Sacred water is also poured on them. Both Hindu and Christian societies believe in such ablutions. Among Muslims, the paper on which there are writings of the Quran, is soaked in water and such water is used to give bathe a patient. Religious and magical charms are pronounced repeatedly by exorcist priests, and they may accompany a ceremony or a ritual with mass feedings. Inhalements are often used to repel or drive out evil spirits. Chilies, camphor, incense, various gums and resins are also used for this purpose. Neem leaf bunches are always used by the exorcists, while pronouncing the charms. Severe beating, burns, tortures are also employed sometimes. Violent resistance and desperate efforts to escape by the 'possessed' are always interpreted as the signs of struggling going on inside the patient's body and mind. The struggle as well as punishments continue till the victim gets cyanosis. The priest persistently asks at last the 'possessed' person what offers he would desire, and the offerings are instantly accomplished. Though extremely cruel practices are now disappearing in India, some traces of them in more ritualized forms are still found among rural and tribal folk all over the country.

Spiritual healing

Sleeping in a temple has been a ritual asylum to give relief to the diseased in many parts of Europe. Cyrene, Gotona, Rhodes and Cos are the places in Greece, where Asclepiads (temple Gods) practised or professed medicine. Hippocrates, the father of modern medicine, belonged to the temple of Cos, but enunciated his own concepts of medicine.

In India, pilgrimage to holy places is often undertaken to relieve ourself of many health problems. Kashi, Kedar, Gaya, Rameshvaram, Chidambaram, Madurai, Tirupati and Sabarimala are among the most famous pilgrim centres. Many renowned *Nātha Siddhas*, the spiritual healers and alchemists, lived in these places. Pilgrimage is now increasingly becoming popular in India, facilitated by ever-improving transportation. Pilgrims bathe, circumambulate the sanctum sanctorum, prostrate, light the lamp and worship the chief deity in various forms. Muslim scriptures sanction pilgrimage to Mecca called Haj. Many tombs of Sufi saints of the past have been accepted as important pilgrim centres, where pilgrims pray to saints for cures, materialistic help and children. Sikh shrines and *gurudvāras* (which means the dwelling place of the master) and Amritsar in Punjab are among the holy place for Sikhs.

Several vows are made by pilgrims including tonsuring, which is common in south India. Other self-punitive methods, like rolling over the ground around the shrine, *bāyige bīga* (piercing the mouth with a sharp pin) and firewalk, are undertaken in some places.

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Symbolically, small silver images of the human body or its parts are offered to the temple after the cure of a particular organ affected by the disease. For example, if any affected limb is cured after the vow, the form of the limb is offered; if eye disease is cured, an image of the eye is offered. Stone-carved idols of a serpent are installed either before or after begetting a child, which is called *naga pratistha,* since barrenness is considered to be *nāga doṣa* (serpent curse).

Charms and spells: The *Ṛgveda* is the earliest record of charms. Various heavenly bodies are invoked to shower blessings, and nature is worshipped for its bestowals. *Oṁ manipadme namaḥ* is the Buddhist charm chanted for various benefits. *Oṁ namassivaya* and *Oṁ namo nārāyaṇāya* are the Śaiva and Vaiṣṇava *bīja mantras* (seed charm), respectively, uttered repeatedly to gain boons like health, wealth, progeny and deliverance after death.

Charms are used for allaying human and cattle diseases in folk medicine. Boils, tumours, growths, stomach ache, skin diseases, scalp abscess, paralysis, habitual abortion, sterility, intermittent fever, headache, snake bite and various paediatric problems are the common diseases, which warrant charm therapy in folk medicine. Preventive, protective, curative, and evil driving charms are usually employed. Ayurveda also recognizes the usefulness of charms in therapy, and certain magical cures of charm therapy are recommended in texts.

Viṣahara mantra (charm to alleviate poisonous effects), *garuda mantra* (for snake bite), *vyāghra mukha stambhana mantra* (to bind the wild tiger's mouth), *sūrya mantra* (for better health), *koḍi mantra* (charm uttered repeatedly to potentiate a pinch of salt, which is to be used for curing specific stomach ailments), *bhasma mantra* (for the potentiation of cow-dung to ward off evil spirits) and *rakṣā mantra* (for protection against harmful creatures and spirits) are among the widely adopted charms, besides one for good progeny (*santāna gopala Kṛṣṇa mantra*), which is repeated for 1008 times.

Amulets

Amulets are worn in India to attain special powers, and also to prevent or cure diseases. The *Atharva veda* elaborates the special effects of several plant and mineral amulets known as *maṇi.* In the *Mahābhārata,* the *Kuṇḍala* and *kavaca* of Karṇa, and the divine *maṇi* of immortality of Asvatthāmā are well-known amulets. *Dharaṇi* was the protective amulet and charm in the Buddhist era. *Rakṣā Maṇi* was another amulet of the Buddhist period made of the seed of a big tree *Elaecarpus ganitrus* Roxb. Later, in the Saiva period, *rakṣā* became *rudrākṣa* (Shiva's eye) which is worn even in present days. Bottle gourd and ankle bells were the amulets among the Natha yogis. Vīraśāivas carried a *liṅga* made of mercury, stone, and herbo-mineral paste called *kante. Yajñopavīta* (sacred thread) is an amulet for Brahmins. In the Vedic period, such a thread was made by *munja* (*Saccharum munja Roxb*) grass. Cotton thread made into a three-stringed *Yajñopavīta* still continues to be worn along with a piece of black buck's skin (*kriṣṇājina).*

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Yantras

Yantras are special amulets. Charms and diagrams made by māntrik (charmer) are written over the stem peel of *sanctified Betula utilis* D.Don Palmyra leaf or of late on paper, which are written on an inauspicious day (eclipse, full moon, newmoon, eighth or fourteenth day of lunar calendar). Animal or human blood, ox bile, sandal paste, vermilion, turmeric power, lac, elephant secretion or ink is used to write charms and diagrams. The written leaf is rolled and put in a specially made small cylindrical or square silver or copper contrivance. Black thread is used for tying it to a wearer on his arm, neck or wrist; and purified mercury or its solid bolus is filled in it and worn as an amulet.

Calotropis procera R.Br., or roof of Betula utilis D.Don, stem peel, bear's hair, nail or skin is also kept in a box-like contrivance for protective effects. Specially-designed thick copper or silver rings are also worn around the ankle or wrist. The pod of *Pongamia galbra L.,* tied with a thread, is worn by children for curing chronic cold, cough and bronchitis. The root of *Plumbago zeylanica L.,* is wound around the arm to relieve jaundice. Some other material objects of amulets are prepared from precious stones with curious shape and colour as well as metal pieces or sheets are preferred. Roots, stem, rhizome, leaf and fruits of curious plants are also worn. Horn, teeth, bone, beak, dead skin, shell and hair of herbivorous or carnivorous animals and birds are also used as amulets. Thin silver, gold and copper foils are used for inscribing magical charms and diagrams. They are rolled and kept in a cylindrical structure, which is wound around any organ of the wearer with a strong black thread. Coins, coin-like metal objects, triangle, hexagon, pentagon, rectangle, square box-like objects and cross or *svastika* amulets are normally made of silver or copper. Metalic coin garlands and bangles made of ivory or bone are the usual attires of Lambanis.

Table I. Metal and Mineral Amulets

Material	Attributed uses and places of wearing	Region where they are in use
Jadestone	Heart palpitation and to divert lightening (neck)	Indo-Tibet border
Turquoise	Boils, snake bite cure(neck)	North India
Black Beads	Luck, Prosperity, Protection against evils (neck)	South India
Gold	Longevity (ears, neck, wrist, waist)	All over India
Mercury bolus (para-ki-goli)	Protective amulet for children (neck, waist)	North West India
Salt	Protective (neck) (Tamil Nadu)	Nilgiri Hills
Charm engraved on gold, copper and silver sheets.	Protective (neck)	All over India

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Table II. Amulets from Animal Sources

Material	Attributed uses and places of wearing	Region where they are in use
Coral	Protective against evil influence of the Sun (neck)	All over India
Cowrie	Proctective against evil eye (neck)	All over India
Hawk bone	Swollen joints (ankle)	Kashmir
Eagle bone	To prevent children's disease (neck)	All over India
Bear's hair	To prevent a child from evil spirits (neck, waist)	South India
Paws of tiger	---------- do ----------	South India
Porcupine spine	To protect pregnant women (head gear)	South India
Antelope's skin	Protective (trunk) during initiation(Upanayanam)	All over India
Umbilical cord	Longevity (neck and to the cradle)	The Punjab and South India
	Amulets from Plant sources	
Plumbago (citrak-root)	Jaundice (Forearm)	Karnataka *zeylanica*
Acorus Calamus	Chronic fever (neck)	Karnataka (vaca-rhizome)
Tinospora cordifolia	Longevity (trunk)	Karnataka (amṛta-stem)
Pongamina glabra	Whooping cough(neck)	Karnataka (*karanj*-pod)
Elephantopus scaber(*goji* root)	Hemicrania (ear)	Karnataka
Saccharum manja (*Muñja*-leaf)	Virilific (waist)	All over India
Imperata cylindrica (*Darbha*-leaf)	Virilific (waist)	All over India
Entada scndens (seed)	Mumps (neck)	Karnataka

FOLK BELIEF SYSTEMS IN HEALTH AND DISEASE

From time immemorial, innumerable number of beliefs have been closely inter-woven into the patterns of human life. Sometimes, such beliefs have originated from ignorance and delusion; yet they have become almost a permanent feature of our society. Often many unexplainable phenomena are connected with beliefs in such areas as birth, development, marriage, and death, on the one hand and, on the other, trade and

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commerce, social customs, agriculture, animal husbandry, and medical care. Some samples of folk belief systems in health, disease and allied aspects found in India are listed below.

Personal hygiene

Cutting hairs and nails are forbidden on new moon day, Tuesday, Saturday and at night;

Father and son should not have hair cut together;

Shaving is forbidden at night;

After a hair cut, one should not touch anybody, before taking a bath;

Lying posture with head towards the north during sleep is to be avoided;

After sleep the right side position is always chosen to get up with a view to preventing any accidents;

Grinding teeth is forbidden since it shortens life span;

Fallen milk tooth is kept in cow-dung ball and thrown over the roof to get new tooth soon;

Anointing oil to head, and head bath is forbidden on Mondays and new moon days;

While sleeping, one should always take the left-side posture.

One should not sleep during dusk;

While sleeping, one should not stretch one's legs towards the east and head towards the north.

Food—Regimen

Drumstick is not a wholesome vegetable;

After drinking milk, one should not drink water; pure milk should not be boiled with water;

If one sneezes during meals, he should stand at once, raise his head and then continue his food;

One should not eat the legs of a chick. If eaten, the person will get tremors in the court of law during inquiry; and young chick should not be eaten.

While taking food, one should not speak depraved or harmful words;

Meat should not be consumed over plantain leaf;

Strict seclusion is observed in cooking non-vegetarian food to ward off the 'evil eye';

Butter milk and milk consumption are forbidden after meat-eating;

If soup is taken out of the household, it should contain whole chilies, salt, and charcoal with a view to avoiding the evil eye;

While eating, head should not be covered by clothes;

Drinking water or milk in standing posture is forbidden;

Too much drinking of water between food is forbidden;

Warm and cold food should not be taken together;

Hiccup is an indication of clandestine eating;

Admonition or crying during meals is forbidden;

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Salt is served first while serving food, which is an indication that the food is not poisoned and, even if it is poisoned, the salt will antagonize its effects;

Eating too much betelnuts causes jaundice;

Egg soup, cooked on the previous day, should not be consumed;

Eating the joint twin plantain causes twin progeny to the eater;

Brinjal and raw plantain should not be cooked together;

One should get up and walk for a while and continue his meals, if one sneezes in between;

Infants should be fed in privacy.

Menarche, pregnancy and child birth

A menstruating woman should not carry other's infants, which may cause diarrhoea. She should not step into the plantain grove, and cut betel leaves, pluck flowers, or do any hard physical labour;

A pregnant woman should not carry infants. Her desires must be fulfilled to ensure timely delivery. She should not step out during eclipse. Her husband should not partake in death rites;

Delayed labour is an indication of female child birth;

The dead foetus and mother's body should be separately cremated;

Delivered woman should not wander alone. She should not eat over plantain leaf;

One should not look at her while taking food. One should not enter her room without a thorough foot wash;

Over-salivation in the baby's mouth is an indication of early learning of speech;

Birth of a baby on Mūlā constellation day brings near death to the parents;

New-born fat babies become lean later;

Sleeping infants should not be gazed at;

Swinging an empty cradle causes stomach-ache to the child; and teething in infants causes diarrhoea.

Disease

Patients suffering from measles, chicken pox, or mumps should not be treated with Western modern medicine;

For curing skin diseases, the anthill mud paste is useful;

Stamping over elephant's dung cures or prevents corns, warts and cracking of the feet;

To treat barrenness, serpent idol installation and worshipping may be undertaken;

Jaundice is caused by eating arecanut;

Diarrhoea is caused in infants after perceiving their mirror image;

A black dot is put over the face of the children to protect them from the evil eye, and other related health hazards; and

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Carrying infants by menstruating woman causes disease; and, killing of a cat causes Parkinson's disease, and slaying of a frog causes skin disease.

Anatomy

Squint eye is a lucky sign;

Large head of the child is a sign of intelligence;

Long hair in women bring misfortune to their husbands; and

Twitches in the right side in women and left side in men are indicative of luck.

An annual Hindu calendar table, called *Pañcāṅgam*, gives a list of 56 anatomical parts of the human body. Specific harbingers are predicted separately for men and women in the event of a domestic lizard falling upon their anatomical parts. This is called *Gauḷī patana phala*, which literally means lizard-fall-prediction. Strangely, predictions differ for male and female, although the anatomical parts are the same.

Remedial beliefs

Evil eye in respect of children has a special remedy. An egg is painted with charcoal and brought near the face of the affected child and moved briskly three times up-and-down, and taken to a place where three roads cross where it is crushed; for severe headache, cautery is done in a temple with a red hot bangle piece;

In the case of severe bronchitis and wheezing in children, cautery using green stick of *Strychnos nuxvmica* tree is done in the area of the sternum and last ribs in the chest region;

For corns and abscess in feet, stamping over elephant dung is the remedy;

For acute throat pain, spitting three times over cow dung in the early hours of the morning without speaking to anybody, is the remedy;

Allopathic medication is forbidden for measles, chicken pox and mumps;

For infantile diarrhoea, a special remedy is prescribed. A herb (*Leucas cephalotes; Spreng)* is worshipped and uprooted. It is tied over the cradle of the infant with a string.

Auspicious stars

Auspicious stars are normally chosen for initiation, marriage, naming or house-warming ceremonies. Many rituals connected with health and disease are also conducted on chosen days, which are supposed to be influenced by auspicious stars. Among the 28 stars of the Hindu calendar, the auspicious and inauspicious stars vary from one occasion to another. Some examples relating to medical rituals are as follows:

Aśvini, Rohiṇi, Mḥgaśirā, Uttarā, Hasta, Citra, Svāti, Aśleśa, Uttāraṣhāḍha, Śrāvaṇa, Dhaniṣṭā,Śatabiṣa, Uttarābhādra and Revati are the auspicious stars for conception *(garbhadhāraṇa). Mḥgaśirā, Punarvasu, Puṣya, Śrāvana, Hasta* and *Mūla* are chosen to alter and select the desired foetal sex (*pumsavana*). During the sixth month of the infant,

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first solid food feeding ceremony (*anna prāśāna*) is celebrated under the influence of *Aśvini, Rohiṇi, Mṛgaśira, Punarvasu, Puṣya, Uttarā, Makha, Hasta, Citra, Svāti, Viśākhā, Anūrādha, Mūla, Uttarāṣāḍt, Śrāvaṇa, Dhanistha, Śatabhiṣa, Uttarābhādra and Revathi.* In children, ear lobes are pierced and golden ornaments worn on the ear as an amulet. For, piercing ceremony of (*karṇa vedha*) *Mṛgaśhirā, Ārdrā, Punarvasu, Puṣya, Uttarā, Hasta, Uttarasadha, Śrāvaṇa, Dhaniṣṭha, Uttarābhārda, Revatī* are superior, *Aśvini, Svāti, and Anūrādhā* are inferior. *Pūrvābhādra and Revati* stars are considered auspicious for the commencement of medical treatment. After illness, to take a ceremonial bath, *Asvini, Dhaniṣṭha, Uttarā, Uttarārṣāḍha, Revati, Svāti,* and *Hasta* stars are selected. However, the compilers of the annual Hindu calendar calculate futher, and give separate lists of auspicious days with dates and accurate time called '*muhūrtam*' and '*lagnam*' for each ceremony. People choose the date among these, according to their convenience.

Medical wisdom in proverbs

Proverbs serve as impersonal vehicles for personal communication. They are expressed in the context of mental conditions like agony, happiness and sarcasm, and proverbial expressions often get deeply fathomed into the listener's mind. Some illustrations of Kannada proverbs (translated into English) on different themes are given below:

(i) Personal hygiene, food and exercise

Anointing head with oil earns good vision;

After meals, wash your feet;

Smoking causes heart disease. Snuffing causes eye disease. Betelnut brings soft palate disease;

Sumptuous meals cause sound body. Good bath leads to lush hair;

Even if you eat less, eat nutritious food;

Disorder in sleep brings disorientation of the mind;

Unlimited food habits lead to overweight;

Spitting leads to disease;

Defecation soon after food leads to bad stomach;

Defecation just before food ruins the house;

Health is wealth;

After lunch, rest a while, and after dinner walk a while;

(ii) Causes and cures of disease

Envy causes consumption;

Overeating causes dysnoea. Fasting causes heart burns;

Fasting is a cure for measles. Good meal is a cure for small pox;

Drinking water followed by eating gooseberry leads to fever with rigors;

Fried brinjal brings scabies;

Feed the cold, and starve the fever;

Frog-eating causes diseases. Eating *iguana*(a reptile) cures diseases;

For unknown disease, give the root of *Aśvagandha*; (*Withania somnifera Dunal).*

Honagonne (Altenanthera sessilis L.) leaves are good for vision;

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To relieve headache, remove constipation;

In winter, people get boils in the head, and in the monsoon they get sores in the feet; and ginger(*Zingiber officinale L.)* is the best medicine.

(iii) Pregnancy and labour

Longings of the pregnant women are a good sign; and

Pregnant women should work hard, parturited women should take rest.

TRIBAL MEDICINE IN INDIA

Tribals live in their natural abodes collecting minor forest products like leaves, berries, tubers, barks of useful plants and honey. Some people hunt fish and raise cattle.

They also practise some type of agriculture, and terraced farming is often practised. Even now, many traditional customs and cultures persist among various people.

Medicine is one of the living traditions of the tribal people. They believe that wrath of goddesses causes various communicable diseases like small pox, chicken pox, measles, mumps and cholera. These goddesses are often worshipped and cloves, betelnuts, coconuts and fruits are offered to appease a chosen goddess. All sections of Indian society, rural, urban or tribal, refer to the diseases like measles, chicken pox, and mumps as *ai* or *ma* or *māta* or *amma*. These words mean the same, the *mother*. The presumed disease-causing goddesses are portrayed as boonful as well as gentle and kind, if they are properly appeased. Otherwise, they are believed to get into a rage soon and bring about sorrow, misery and diseases. In South India, the destructive nature of these goddesses are symbolically referred to as *Māri kopa* (anger of the destructive goddess). The general belief all over India is that sacrifices are to be made with due reverence and recognition to prevent the outbreak of major epidemics.

Nevertheless, tribals ascribe some diseases to natural causes. They do think that women have syphilis, and men contract this and gonorrhoea by sexual contact. Fermented alcohol, hot, pungent food aggravates it. Excess exposure to sun and extreme climatic conditions cause gonorrhoea. Sexual contact of women during menstrual flow may also cause sexually-transmitted diseases. Headache, diarrhoea, cough, cold and fever are some of the diseases caused by natural causes. The role of physical factors such as water, weather, heat, cold, excessive sexual indulgence and alcohol are considered to be causative of diseases. Even so, sudden death or serious diseases are supposed to be caused by supernatural causes. Supernatural forces are generally believed to dwell in cremation grounds and graveyards, and old deserted habitations. People avoid neem and tamarind trees at nights, since it is also regarded as an abode of supernatural spirits.

From folklore to fame

The acceptance and clinical application of plants used in ancient time, such as *Sarpagandha* and the poppy plant, by the Western world in recent years has revolutionized the entire field of medicine. Millions of sufferers are benefited by the use of these age-old

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remedies. During the past three decades, *Sarpagandha* has not only blazed an entirely new and unprecedented trail in the study and alleviation of mental disorders and high blood pressure, but has also served to focus the attention of the entire medical world on ancient pharmacopias.

Captain Saint referred to our country as a "Veritable encyclopedia of the vegetable world". *Rauwolfia serpentina Benth (Sarpagandha)* is one of such vegetable drugs used by Indian folk in the name of *Cotacand.* It was used as *Pāglonka dava* (medicine for lunatics), and gained world-wide popularity and fame. *Sarpagandha* also became a very good drug to control hypertension. Morphine is another example. It is derived from the poppy plant (*Papavar somnifera L.*), and is used in the cure of insomnia and colic pain. Poppy seeds are consumed in India for their high nutritive and sleep-inducing properties.

In most developing countries, the entire flora has remained virtually unexplored from the point of view of their pragmatic utilization. Yet, past experience shows that many valuable drugs have been derived from plants. Any information on the use of plants in traditional medicine is often an indication that it is worth studying it scientifically. Such discoveries will benefit the pharmaceutical industry based on local resources, thus enriching a nation's economy. Before investigating the plants which are reported to be useful in ethno-medicine, some guidelines have been suggested by Farnsworth. "There are three types of categories of ethno-medical claims. Each of these most probably has different degrees of credibility. The most credible types of ethno-medical claims would be those arising from a system of medicine, that requires formal training of some type. For example, practitioners of traditional medicine of China and Ayurveda in India are required to undergo formal training. Follow-up of medical claims based on such systems would seem to be potentially most rewarding. The second type of ethno-medical claims would arise from a system of medicine that might not involve training, but rather an opportunity is required.

"The final category of information might be folk medicine or that derived from persons, who may know from experience that a plant extract has a useful information about its effect to another person. Usually, folklore information comes from person to person who had no formal training apprenticeship in a recognized or semi-recognized system of medicine. Such information would be more susceptible to variation and distortion during its passage from person to person, and thus would have the least degree of credibility for anyone interested in subjecting plants to rigorous scientific study."

History shows that drugs such as quinine, atropine, reserpine, tubocurarine, morphine, codiene, digitoxin and digoxin have been discovered on the basis of the information that a plant was used in one or more of the traditional medical systems (Farnsworth).

In India, folk medicine still forms a system separated from the main structure of health-care. However, since the 19th century, it has been gradually replaced by modern medicine. The network of barefoot doctors is unique to the Chinese system, whereas in the Indian context, such network never existed at any level. Lovers of folk medicine always claim that it is holistic in approach, economical, accessible to all and safe and modern medicine is just the opposite. But modern medicinal enthusiasts term folk

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medicine as unscientific and absurd, since they expect marvellous results from it. Indeed, we are at the crossroads now!

Are the two systems mutually exclusive or do they coexist? Only time can answer this question. Aldous Huxley has rightly said: 'The forms change, but the substance remains'.

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CHAPTER 20

Plant Science

S. Sundara Rajan

Ancient India was one of the cradles of early human civilization. It was here, like in the other contemporary civilizations in one or two other places, the evolving human mind awakened itself to the surroundings and began to ponder over the relationship between man and nature, his spirit within and the material world outside. The world at large has recognized the contributions of early Indians towards religion, philosophy and cognate matters. But there is scarcely any mention, leave alone any appreciation, of the contributions of ancient Indians towards an understanding of the physical and biological world. The entire ancient Indian people are generally dubbed as a race which was more other-worldly than worldly, and the ancient Indian seers have been branded as a group which had indulged only in philosophical matters. This opinion about our ancestors, first proposed by Western scholars and historians, has almost gained ground even among Indians.

Is this true? Is it a fact that a civilization, which arose much earlier than Greek and Roman civilizations, is alive even today for more than 5000 years following essentially the same attitude to nature, set of rules, rituals etc., if ancient Indians were to be always other-worldly and not interested in pressing the environment into human service? A close examination of the Indian ethos reveals that they had acquired mastery over their physical and biological environment through constant study, observation and experimentation whenever it became necessary, with a view to leading a healthy and harmonious life. The lack of appreciation among Western scholars on this dimension of ancient India is by and large due to their ignorance of Indian traditional sciences. Many historians of the West simply assume that India did not exist in the past as far as experimental science is concerned. Norden Skiold, a historian of biology, remarks: "The civilized people of Eastern Asia, the Hindus and the Chinese, have likewise contributed very little of importance to the development of Science of Biology." A. B. Keith, a historian of Sanskrit literature, has observed that experimental science had never developed in India because of Indians' preoccupation with religion and philosophy.

The opinions of such as these Western Indologists is widely off the mark, while analyzing the contributions of ancient Indians towards natural sciences. In particular,

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there are a large number of textual references in Sanskrit, which speak of the environment, plant kingdom, maintenance of positive health, harmony between man and nature, and the need to use the environment for human welfare, apart from astronomy, mathematics, gemmology, perfumery and pyrotechnics.

Concept of Science (ancient Indian vis-à-vis the Western approach)

It is desirable to understand the nature and structure of what we call *Science*. According to one explanation, science is the pursuit of systematic and formulated knowledge, encompassing generally the material phenomena, and is based on observation, experiment and inference. Another significant character of science is the repeatability and verifiability of an experiment by any one following the accepted set of rules and procedures. If we limit ourselves to the above definition of science, the question that naturally arises is, was there science in ancient India? Before answering this question, we can briefly analyze how did the concept of science develop in Europe and other Western countries, who claim to be true inheritors of what is called the scientific spirit. If we go back to the early times, even in the West, science was regarded as 'Natural philosophy', meaning thereby a methodical contemplation of natural processes *per se*. But, very soon, science deviated from philosophy in the West through its emphasis on the methodology of experimentation, observation and inference. As a result of this dichotomy, there ensued several conflicts and prejudices between the practitioners of religion and philosophy on the one hand, and the practitioners of science on the other, particularly when the observations of the latter did not conform to the dogmatic view-point of the former. History has recorded some persecutions and/or excommunication of scientists for holding a view contrary to the one held specially by leaders of organized religion

It is refreshing to note that throughout its history, India seems to be free from these prejudices; for, we never hear of any persecution of a scientist in ancient India for holding a view contrary to religion. One can argue that the question of persecution of scientists in ancient India did not arise, because there was no science at all in ancient India. This view, however, is incorrect, because one could see the rational thinking that was integrated with Indian ethos in spite of aberrations here and there.

The Indian view of science is holistic encompassing men and nature, and all aspects of life. Ancient Indians did not consider that science was just a method totally divorced from other aspects of knowledge. In the search for truth, science also was one of the means just as religion or philosophy was then as now. It is *in this frame of mind they regarded both (science and religion) as not mutually conflicting, but mutually contributing.* In other words, the pursuit of science and the pursuit of religious thinking were merely two path-ways that would ultimately reach the same goal, while their approach could be different.

In ancient India, a healthy amalgam was achieved between scientific views and religious practices. Ancient Indians had devised a method of reaching scientific concepts to common man by providing a religious garb. In other words, many of the religious practices had a scientific basis and rationale, but the emphasis was on the religious

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aspect. This way, scientific concepts (which may not be easily understood by every one) gained universal acceptability, as they had a religious exterior even though they were not implicit.

In ancient India, scientific observation started perhaps during the Vedic period. The inquisitive mind of the Vedic seers, which started with uni- solar observations, delved into the mysterious realms of nature, probed into the riddles of matter, life and mind, and eventually passed into the depth of ultimate reality.

Ancient Indian visionaries had classified knowledge into three main divisions—*Vijñānaṃ, Saṃjñānaṃ and Prajñānaṃ. Vijñāna* can be more or less equated to the modern analytical knowledge of the physical world; *Saṃjñāna* may be said to deal with the whole cosmos in its inherent nature; and *Prajñāna*, the knowledge about the one and only source of all cosmos as well as the phenomenal. *Vyāpaka jñāna is Vijñāna; Saṃyak jñāna is Samjñāna; and Prakrṣṭa jñāna is Prajñāna.* We thus find that in the matrix of total knowledge, the Indian ethos accorded a place to material science also, even though it does not believe (and rightly so) that science is the only path of attaining truth.

The discussion given above on the antiquity of scientific heritage in India will leave no one in doubt, that the spirit of scientific enquiry has been a part of Indian tradition since Vedic times, if not earlier. There is a wealth of written evidences, which unequivocally prove the scientific achievements of ancient Indians, in such areas as astronomy, mathematics, botany, zoology, chemistry and medicine. Germane to us in this chapter, is the ancient Indian botanical knowledge or plant science.

SOURCES OF INFORMATION

Several sources are available, which are of value to trace the origin and development of plant science in India, starting from the Vedic times or even earlier. These may be briefly categorized into three : (i) Archaeological; (ii) Sculptural; (iii) Written records.

Archaeological excavations of a large number of sites have brought to light charred remains of several types of cereals and pulses indicating their cultivation at that time. Temple sculpture, rock edicts and others have depicted a variety of plants. Some information (may not be always accurate) can be gathered from these sources also. Written records, however, are quite exhaustive, and many a time well-documented giving a true picture of the knowledge of plants of that particular period. Written records, either in the form of manuscripts or printed ones, are available in Sanskrit and several other Indian languages; but the latter by and large are based on Sanskrit sources. For the purpose of gleaning informative data on plant science, Sanskrit literature may be categorized into three : (i) Sacred literature; (ii) Lay literature; and (iii) Technical literature.

Sacred literature includes the Vedas, the Upaniṣads, in which philosophical works and epics like the *Rāmāyaṇa* and the *Māhābhārata*, there are a number of succinct references to plants. The lay literature includes prose, poetry, and drama of a number of Sanskrit greats like *Kālidāsa, Māgha* and *Bhavabhūti*, in which the information on plants is incidental and given by way of comparison. Technical literature comprises medical

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works like the *Caraka* and *Suśruta saṃhitās,* lexicons like *Medinīnighaṇṭu* and *Amarakośa,* as well as the encyclopedic works like *Arthaśāstra* and *Bṛhatsaṃhitā.* These works generally give excerpts of botany or what is known as *vṛkṣāyurveda.* In addition, there are a number of exclusive works under the title of *Vṛkṣāyurveda*. Several such manuscripts are available, including the one in Bodlean Library (Oxford). Among these, *Parāśara's Vṛkṣāyurveda* is supposed to be the most ancient, and believed to have been composed during first cent B.C. and first century. A.D.

MEDICAL BOTANY

Ayurveda, the famous ancient Indian health science, had reached an exalted state of development as early as the 1st cent. A.D. The botanical basis of Ayurveda must have been firmly established by then because the bulk of Ayurvedic drugs belongs to the vegetable kingdom. A number of Ayurvedic texts deal with botanical aspects, mainly identification and categorization of plants as source of drugs.

The *Carakasaṃhitā,* one of the Ayurvedic classics, has a chapter titled *Vibhāgavidyā,* dealing with the classification of plants and animals.

Plants or vegetation *(Udbhijja)* have been categorized into as many as 50 groups, based on their physiological actions on the human body. Thus, the classification was a therapeutic one. The categories of plants are:

1. *Jīvanīya* (promoting longevity); 2. *Bhāmanīya* (nourishing); 3. *Lekanīya* (reducing obesity); 4. *Bhedanīya* (promoting excretion); 5. *Sandhānīya* (promoting the joining of fractures); 6. *Dīpanīya* (promoting digestion); 7. *Baliya* (promoting strength); 8. *Varṇya* (brightening complexion) 9. *kaṇṭhya* (improving voice); 10. *Hṛdya* (Improving cardiac functioning); 11. *Ṭṛptighna* (removing satiation); 12. *Ārṣaghna* (curing piles or haemorrhoids) 13. *Kuṣṭaghna* (curative of skin diseases); 14. *Kaṇḍūghna* (curative of pruritus); 15. *Krimighna* (cures worms); 16. *Viṣaghna* (antidote to poisoning); 17. *Stanyajanana* (promoting lactation); 18. *Stanyaśodhana* (purifying breast milk); 19. *Śukrajanana* (promoting semen generation); 20. *Śukraśodhana* (purifying semen); 21. *Snehopaga* (emollient); 22. *Svedopaga* (diaphoretic); 23. *Vamanopaga* (emetic); 24. *Virecanopaga* (purgative); 25. *Aruṣṭapanopaga* (useful for corrective enema); 26. *Anvasanopaga* (useful in enema); 27. *Śirovcrecanopaga* (prevents discharge from nose); 28. *Cardinigrahaṇa* (curing nausea); 29. *Tṛṣṇānigrahana* (cures acute thirst); 30. *Hikkānigrahaṇa* (cures hiccups); 31. *Purīṣa samagrahaṇīya* (helps in making faecal matter consistent); 32. *Purīṣaviuaranīya* (alters the colour of the faecal matter); 33. *Mūtrasaṃgrahaṇīya* (corrects excessive urination); 34. *Mūtravivarjanīya* (cures coloured urine); 35. *Mūtravirecanīya* (diuretic); 36. *Kāsahara* (cures cough); 37. *Śvāsahara* (cures laboured breathing); 38. *Śvayathuhara* (cures swelling and oedema); 39. *Jvarahara* (cures fever); 40. *Śramahara* (cures fatigue); 41. *Dāha praśamana* (ameliorates burning sensation); 42. *Śītapraśamana* (cures cold); 43. *Udaradapraśamana* (cures urticaria); 44. *Aṅgamardapraśamana* (cures pain in limbs); 45. *Śūlapraśamana* (cures pain in bowels); 46. *Soṃilasthāpana* (haemostatic); 47. *Vedanāsthāpana* (anodyne); 48. *Saṃjñānasthāpana* (resuscitative); 49. *Prajāsthāpana* (cures sterility); 50. *Vayaḥsthāpana* (retards ageing);

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Caraka also mentions that the following parts of plants are used in medicine. *Mūla:* (root), *Tvak* (bark), *Sāra* (pith), *Niryāsa* (resin or exudate), *Nāla* (hollow stem or stalk). *Khara:* (prickly parts), *Pallava* (sprout or young shoot), *Kṣāra* (alkaline extract), *Kṣīra* (milky sap), *Phala* (fruit), *Puṣpa* (flower), *Bhasma* (plant ash), *Taila* (oily extract), *Kanṭata* (horn), *Patra* (leaf), *Śuṅga* (sheath or calyx of flower bud), *Kāṇḍa* (bulb), *Praroha* (parasitic parts on the host).

The *Suśruta saṃhitā,* the second Ayurvedic classic, also deals with several aspects of botany such as morphology and taxonomy. Apart from describing the various parts of a plant, Suśruta provides classifications of plants to suit medicinal purposes.

Suśruta has actually given two systems of classification of plants. In one of the classifications, where plants are divided into 35 *vargas* (groups), the basis being their therapeutic properties. But it is significant to note that the *vargas* are named after the prominent or familiar plant in each group.

The arrangement of plants in each *varga* is in the ascending order of the intensity of their therapeutic value. Among the 35 *vargas,* the first 33 are entirely of plants, while the last two have plants as well as minerals.

These groups are:

Name of group	*Name of type plant*
1. Ambaṣṭhādi	*Ambaṣṭha (Cissamopelos Pariera)*
2. Āmalakādi	*Āmalakī (Phyllanthus emblica)*
3. Añjanādi	*Añjana*
4. Argvadhādi	*Aragvadha (Cassia fistula)*
5. Arkādi	*Arka (Calotropis gigantea)*
6. Daśamūla	*Trikanṭaka, Bilva.*
7. Elādi	*Ela (Elettaria cardamomum)*
8. Guḍūcyādi	*Guḍūci (Tinspora cardifolia)*
9. Kakolyādi	*Kakoli (Mimusolps kaukii)*
10. Lākṣadi	*Lākṣā (Cocus lacca)*
11. Muṣkakadi	*Muskaka (Schrebera switentiodes)*
12. Mustādi	*Musta (Cyperus rotundus)*
13. Nygrodhādi	*Nyagrodha (Ficus bengalensis)*
14. Kaniya Pañcamūla	*Trikantaka*
15. Mahat Pancamūla	*Bilva*
16. Valli Pancamūla	*Vidāri*
17. Kantaka Pañcamūla	*Karamarda*
18. Tṛṇa Pañcamula	*Kula*
19. Paausakādi	*Parusaka (Greura asiatica)*
20. Patolādi	*Patola (Trichosanthes dioica)*
21. Pippalyādi	*Pippalī (Piper longum)*
22. Priyaṅgvādi	*Priyangu (Aglaia roxburghiana)*
23. Rodhrādi	*Rodhra*
24. Sālasaradi	*Sāla (Shorea robusta)*
25. Sarivādi	*Sariva (Hemidesmus indicus)*

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26. *Surasādi*	*Surasa (Ocimum spp)*
27. *Śyāmādi*	*Śyāma*
28. *Trikaṭu*	*Pippalī (Piper longum)*
29. *Triphalā*	*Harītakī (Terminalia chebula)*
30. *Utpalādi*	*Utpala (Nymphea spp)*
31. *Vacādi*	*Vaca*
32. *Varuṇādi*	*Varuṇa (Craleva religiosa)*
33. *Vidārighandādi*	*Vidarigandha (Desmodium angeticum)*
34. *Viṛatarvādi*	*Virataru*
35. *Bṛhatyādi*	*Bṛhatī (Solanum indicum)*

In another classification, plants have been divided into *Saṃśodhana* (purifying) and *samśamana* (pacifying) groups. Each of these is further divided into three groups as follows:

Saṃśodhana: (I) Ūrdhavabhāga (emetic drugs); (ii) *Adhobhāga* (purgative drugs); and (iii) *Śirovirecana* (errhines).

Saṃśmana (I) Vātasaṃśmana (drugs that relieve *vāta*); (ii) *Pittasaṃśmana* (drugs that relieve *pitta)*; and (iii). *Śleṣmasaṃśamana* (drugs that relieve *kapha*)

Suśruta has adopted one more classification of plants based on their dietetic value as follows:- *Dhānyavarga* (cereals); *Phalavarga* (fruits); *Śākavarga* (pot-herbs); *Puṣpavarga* (flowers); *Udbhida varga* (mushrooms); *Kāṇḍavarga* (bulbs)

Some of these vargas are further divided as follows:

Dhānyavarga: *Śālivarga (paddy)*; *Kudhānya varga (inferior cereal)*; and *Sāṃidhānyavarga* (legumes).

Udbhidavarga: As noted before, refers to the mushroom group. It is further divided into five sub groups, based on the source on which the mushrooms grow as follows: (i) *Ikṣuja* (on sugarcane); (ii) *Karīśa* (on cow dung); (iii) *Kṣhitija* (on soil); (iv) *Pāṭala* (on straw); and (v) *Veṇuja* (on bamboos).

The type of classifications of vegetable drugs provided in the medical treatise was one of convenience from the view-point of therapeutics. As can be seen from the description given above, the classifications were not based on botanical characteristics, even though the individual plant was identified based on its botanical characters. Groups were identified and plants with diverse botanical characters were put together for the convenience of a medical practitioner.

PLANTS IN THE VEDAS

The term used in the *Ṛgveda* and later *saṃhitās* for tree is *vrkṣa,* while the general name for plants is *vīrudha*. Plants, which have healing properties (of medicinal use), are called *oṣadhi*. Creeping plants have been given the name *libuja* or *vratatī*.

The most celebrated plant that finds frequent mention in the *Ṛgveda* and later *saṃhitās* is *Soma plant.* The Vedic Indians hail *soma* as the Lord of the forest *(vanarāja)*. In fact, the whole of the ninth *maṇḍala* of the *Ṛgveda* and six hymns in other *maṇḍalas*

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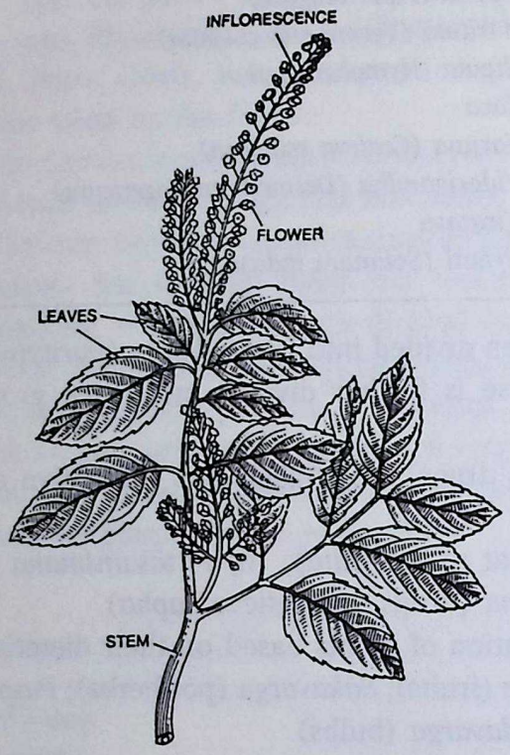
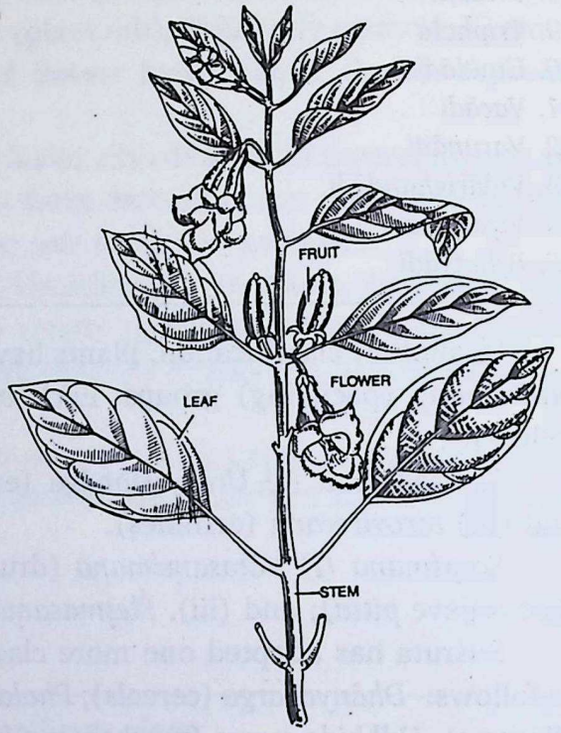
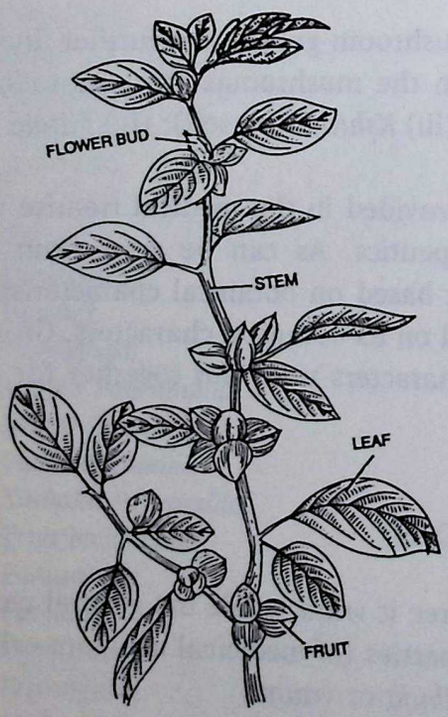
SOME WELL-KNOWN PLANTS



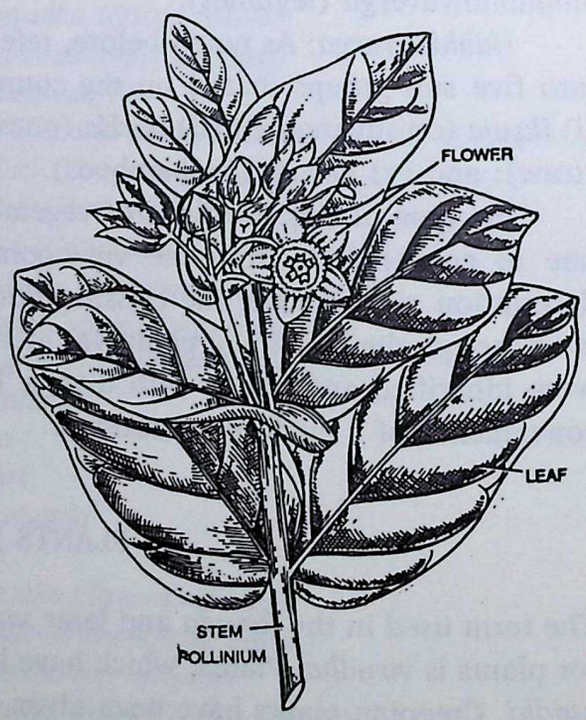
1. Tulasī: *Ocimum sanctum* Linn.



2. Tila: *Sesamum indicum* Linn.



3. Aśvagandhā: *Withania somnifera* Dunal.



4. Arka: *Calotropis procera* (Ait.) R. Br.

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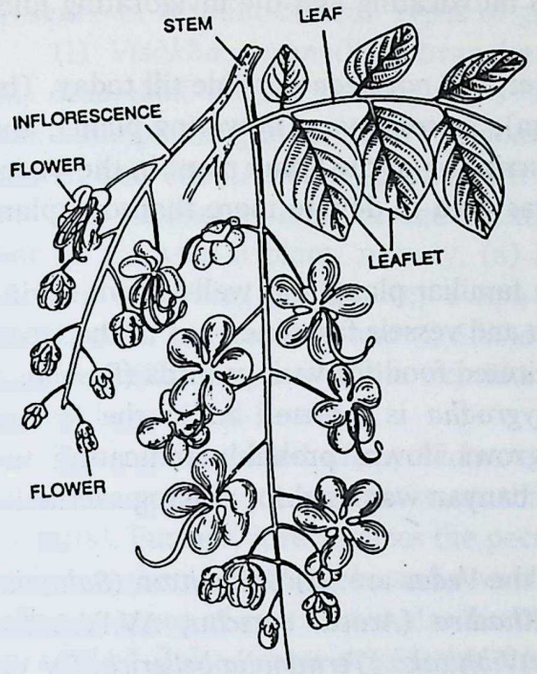
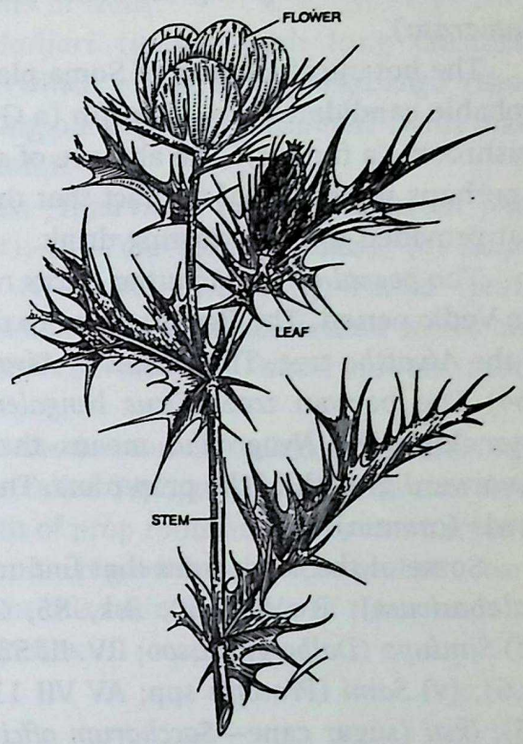
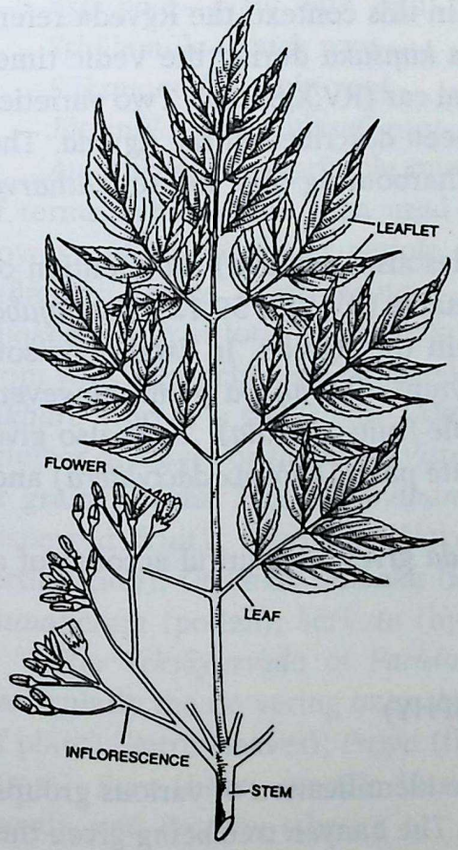


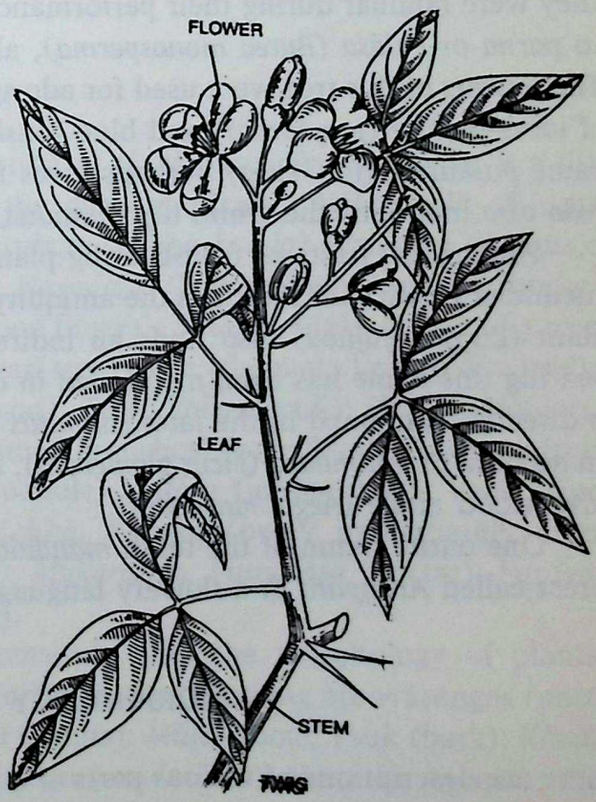
5. Śamyaka: *Cassia fistula* Linn.



6. Datūra: *Argemone mexicana* Linn.



7. Nimba: *Azadirachta indica* Juss.



8. Bilva: *Aegle marmelos* Corr.

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are devoted to eulogising the *Soma* plant, and its intoxicating and the invigorating juice (*Somarasa*).

The botanical identity of Soma plant, however, has not been possible till today. The probable candidates are—*Ephedra* (a Gymnosperm); *Sarcostemma* (flowering plant); and Mushroom (a fungus). The absence of specific description of the Soma plant in the Vedas is perhaps indicative of the fact that the name was used to denote more than one plant that provided the intoxicating drink.

The *peepal* or the *Aśvattha* (*Ficus religiosa*), a familiar plant, was well-known during the Vedic period. The *Ṛgveda* refers to the utensils and vessels fashioned out of the wood of the *Aśvattha* tree. The berries of *Aśvattha* constituted food for various birds (*Ṛgveda,* I, 164). The banyan tree (*Ficus bengalensis*) or *nygrodha* is referred to in the Vedas. Etymologically, *Nyagrodha* means that which grows down, probably indicating the downward growth of the prop roots. The wood of banyan was used for making sacrificial bowls (*camasa*).

Some of the other trees that find mention in the *Vedas* are: (i) Silk cotton (*Salmalia malabaricum*); Rv.VIII, 50, 3:x, 85, 20); (ii) *Khadira* (*Acacia catechu*; AV.IV,6,1.); (iii) *Śiṃśupa* (*Dalbergia sissoo*; RV. III 53, 191); (iv)*Vibhītaka* (*Terminalia bellerica*; RV VII 86,6); (v).*Śami* (*Prosopis* spp; AV VII 11, 1:30); and (vi).Plakṣa (Ficus infectoria; AV V, 5:5); *lkṣu* (sugar cane—*Saccharum offcinarum*) finds a mention as a cultivated plant in the *Atharva veda, maitāryaṇī saṃhitā*, and other texts.

Vedic Indians had known a number flowers and flower-bearing plants with, which they were familiar during their performance of rituals. In this context, the Ṛgveda refers to *parna* or *Palāśa (Butea monosperma)*, also known as *kiṃśuka* during the Vedic time. The flowers of this tree were used for adorning the bridal car (RV.X,85,20). Two varieties of lotus—white (*puṇḍarīka*) and blue (*puṣkara*) have been described in the *Ṛgveda.* The name *puṣkariṇī* (for lakes) perhaps owes its origin to harbouring blue lotuses. *Atharva veda also* mentions the white lily (*kumuda).*

Among the fruits or fruit-bearing plants, (vegetables also included) the mention of cucumber (*urvāruka*) indicates the antiquity of this vegetable (RV VIII, 59,12). The *jujuba* plant (*Zizypus jujuba*) also finds an indirect mention in the *Ṛgveda.* In fact, a person bearing this name has been mentioned in one of the hymns. The *jujuba* plant, however, is directly mentioned in the later *saṃhitās* with its edible-fruits (*kuvala*). They also give an account of *udumbara* (*Ficus glomerata*), *kharjūra*—date palm (*Phoenix dactylifera*) and *bilva* wood apple (*Aegle marmelos*).

One entire hymn of the tenth *maṇḍala* of the *Ṛgveda* gives a beautiful account of a forest called *Araṇyāni* in a flowery language.

MORPHOLOGY (PHYTOGRAPHY)

There are descriptions of various parts of a plant and the identification of various groups of plants in Sanskrit literature starting from Vedic times. The banyan tree being given the name, *Nygrodha,* etymologically is a clear indication of the prop roots growing downwards.

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The *Atharvaveda* is perhaps the earliest recorded authority on plant morphology. It presents an account of eight types of growth habits of trees:

(i) *Viśākhā* (spreading branches); (ii) *Mañjarī* (leaves with long clusters); (iii) *Sthambinī* (bushy plants); (iv) *Prastānavatī* (which expands); (v) *Ekaṣṛṅga* (those with monopodial growth); (vi) *Pratānavatī* (creeping plants); (vii) *Amśumatī* (with many stalks); and (viii) *Kandinī* (plants with knotty points).

The *Vājasaneyī saṃhitā* and *Taittirīya saṃhitā* (*Yajurveda*) mention different parts that go to make a plant, namely, (a) *Mūla* (root); (b) *Tula* (primary axis); (c) *Kāṇḍa* (stem); (d) *Valsa* (twig); (e) *Puṣpa* (flower); (f) *Phala* (fruit); (g) *Parṇa* (leaf); (h) *Skandha* (the crown); and (i) *Sākhā* (branch). Pāṇini and Patañjali in their works also mention different parts of the tree like *Mūla, Skandha, Phala* and *Palasa* sprouts, roots, trunks, leaves and flowers.

The root is called *Mūla, Pāda* or *Budhna* in the lexicon compiled by *Amarasimha* called *Amarakośa,* which also states that trees are called *Pādapa* (that which sucks from its roots). Further, it recognizes the peculiar growth of prop roots and gives two names to designate them—*Śākhāsipha* and *Avaroha*. Based on their growth behaviour and structure, different types of roots have also been classified in this lexicon. Some of these are :

Śākhā śipha—roots originating from the branches
Kṛṣṇamūlī—black-coloured root
Śveta mūlī—white-coloured root
Bahumūlī—many roots
Tripādī—plant with three main roots
Aṣṭa pādī—plant with eight roots
Sthūlamūla—thick root
Sūkṣmamūla—Thin root
Jāṭamūla—fasciculated root

Amarakośa is a veritable mine of information of plant parts. The following is a list of terms, which have been used to describe the parts of plants : *Nāla* (stalk of lotus flower); *Mṛṇāla* (tubular petiole of lotus); *Karahata, (śiphā kanda)* (rhizome of lotus); *Kiñjalka, Kesara* (Androecium); *Saṃvartika, Navadala* (leaf primordium); *Varataka, Bījakośa* (fruit of lotus); *Praphulla, utphulla* (open flower); *Sthāṇu, Śāṅku* (trunk of a tree from which branches are removed); *Kṣupa* (dwarf tree); *Sāla* (the main branch of a tree); *Śikhara* (top of a tree); *Śara, Majja* (heart-wood); *Tvak, Valka* (bark); *Vallari, Mañjari,* (cluster of leaves or flowers); *Viṣṭara, Viṭapa* (small branches) (branchlets); *Sasyam* (fruit or grain); *Vṛnta, Prasavabandhana;* (pedicel, petiole); *Salāṭu* (unripe fruit); *Vana* (ripe dispersed fruit); *Kṣaraka, Jālaka* (ovary); *Kalikā, Koraka (*ovary immediately after fertilization); *Guccaka, Stabaka* (inflorescence); *Makaranda, Puṣparasa* (nectar); *Parāga, Sumanoraja* (pollen); *bārhata* (hypanthodium).

The *Vṛkṣāyurveda* of *Parāśara* deals extensively with the morphology of plants, particularly the flowering ones. According to *Parāśara*, the following are *vṛkṣāṅgas* (parts of plant): *Patra* (leaves); *Puṣpa* (flower); *Phala* (fruits); *Mūla* (root); *Tvak* (bark); *Kāṇḍa* (stem); *Sara* (heart- wood); *Svarasa* (sap); *Niryāsa* (exudations); *Kanṭaka* (spines); Bīja (seed), and *Praroha* (shoot).

The fourth chapter of *Vṛkṣāyrveda,* viz, *vṛkṣāṅga sūtrādhyāya* clearly describes leaf morphology. The insertion of the leaf *(vṛntabandhana)* and phyllotaxis *(patrabandhana)*

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have been dealt with in great detail. Leaves have been classified into various categories, based on their shape and resemblance with other organisms. In addition, based on the structure of venation, Parāśara has recognized two types of leaves—*Maunja paṛṇa* (parallel veined) and *Jālika parṇa* (net Veined). Parāśara mentions that *maunja parṇa* is characteristic of monocotyledons *(ekamātṛka)*, and *jālika parṇa* is characteristic of dicotyledons *(dvimātṛka)*

Sanskrit literature abounds in expressions, that reveal the knowledge relating to a variety of shapes, colour, texture, smell, taste, structure, etc. of the leaves. The following are some of the examples.

Shape : *Dīrgha patra* (long leaf); *Maṇḍala patra* (rotund leaf); *Viśāla patra* (broad leaf);

Colour : *Sveta patra* (white-coloured); *Rakta patra* (red-colored); *Nīla parṇa* (blue-coloured); *Suvarṇa parṇa* (gold-coloured); *Dhūmra parṇa* (smoke-coloured);

Texture : *Mṛdu patra* (soft leaf) ; *Komala patra* (Tender leaf); *Snigdha patra* (rough, thick leaf)

Taste : *Svādu patra* (sweet leaf); *Āmla patra* (sour leaf); *Kaṭu patra* (bitter leaf); *Tīkṣṇa patra* (hot taste)

Surface : *Randhra patrī* (leaf with holes); *Valka patrī* (bark-like); *Kaṇva patrī* (with spines); *Romaśa patrī* (with hairy outgrowth)

There are also references to the number of leaf or leaflets.

For example: *Ekapatrika* (one leaflet); *Dvipatrika* (two leaflets); *Tripatrika* (three leaflets); *Catuspatrika* (four leaflets); *Pañcapatrika* (five leaflets); *Saptaparṇi* (seven leaflets); B*ahupatrika* (a number of leaflets). In addition, there are descriptions of flowers and inflorescences, as evidenced by the terms used for describing a flower at different stages of its development. Young flower buds are called *Kalikā* and *Korakā* ; just opened flower buds *Mukula* and *Kudmala,* while fully-opened flowers are called *Vikaca* and *Sphuṭa.* Moreover, the following two basic types of inflorescences have been recognized corresponding to the modern classification: *Mañjari* (*Racemose* inflorescences); *Stabaka, Guccaka* (*Cymose* inflorescences). Further sub-divisions of inflorescences are—*Srīhastini* (*Helicoid cyme*), *Chatra* (*Umbellate*), etc.

There are also other terms, which can be identified from the modern botanical point of view. Pedicel (stalk of flower) is called *Prasava bandhana* (means the attachment to the mother plant); *Puṣpacchada, Jalaka* (calyx); *Puṣpadala* (corolla) ; *Kesara* (*Androecium*); *Parāga* (pollen); and *Varātaka* (pistil).

It is thus obvious that all the basic parts of plants had their technical nuances, and were studied in great detail as this was a pre-requisite for the classification and identification of plants.

SYSTEMATIC BOTANY

Classification in Vedic Texts

As noted before, right from the time of the *Ṛgveda*, an attempt has been made to classify and name the plants based on their morphological characters. The *Ṛgveda* (X 97.15) has

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classified plants into *Vṛkṣa* (trees), *Oṣadhi* (herbs) and *Vīrudh* (creepers). Plants have also been classified into *Puṣpavatī* (flowering) and *Phalavatī* (fruit-bearing), and grasses have been identified as *Tṛṇa*. The *Atharvaveda* (VIII.7) has given a division of plants into various categories based on their morphological characters and other properties, such as *Prasthānavati* (spreading), *Sthambini* (bushy), *Ekasugna* (with single whorl of calyx), *amśumati* (having many shoots), *Kandini* (jointed), *Viśākha* (having extending branches), *Jīivāla* (lively), *Nagharīśa* (harmless) and *Madhumati* (very sweet). Of the latter authorities, the classification as described by Manu, Caraka, and Udayana deserve special mention.

Manu's classification

Manu, the traditional law giver, has thrown light on the division of plants under eight categories, namely: (i) *Oṣadhi* (bearing fruits and flowers, but withering away after the development of fruits) ; (ii) *Vanaspati* (bearing fruits without evidence of flowers like fig); (iii) *Vṛkṣa* (bearing flowers and fruits); (iv) *Guccha* (bushy plants); (v) *Gulma* (succulent herbs); (vi) *Tṛṇa* (grasses); (vii) *Pratāna* (spreading creepers); and *Vallī* (climbers and twiners).

Caraka, in his *Saṃhitā,* (the ancient Ayurvedic text) has devoted an exclusive chapter called *Vibhāga vidyā* which deals with classification of substances used in medicine.

Udhbhida (medicinal substances of plant origin) have been classified into four types: (i) *Vānaspati* (plants with fruits only—no flowers); (ii) *Vṛkṣa* or *Vanaspatya* (bearing both fruits and flowers); (iii) *Vīrudh* (creepers), and (iv) *Oṣadhi* (annual herbs which die after fruition).

He has further divided the *Udbhida* (plants) into as many as 50 groups based on their physiological actions and diseases they cure, besides classifying flowering plants into the following seven heads based on dietetic principles :

(i) *Sukadhānya* (cereals); (ii) *Sāmidhanya* (pulses); (iii) *Śāka varga* (pot herbs); (iv) *Phala varga* (fruits); (v) *Harīta varga* (vegetables); (vi) *Āhāyogi varga* (oils); and (vii) *Ikṣu varga* (sugarcane).

Udayana's *Kiraṇāvalī* has given seven groups of plants :

(i) *Vṛkṣa* (plants with trunk, branches, flowers and fruits); (ii) *Tṛṇa* (ulupa like plants); (iii) *Oṣadhi* (*kaluma* like plants which die after fruition); (iv) *Gulma* (*bhata* like plants); (v) *Latā* (kūṣmaṇḍa like plants); (vi) *Avatāna* (*ketaki* like plants); and (vii) *Vanaspati* (plants which produce fruits without flowers);

Nomenclature of plants

In ancient Indian texts, plants were generally given two names: Of them, one was based on botanical characters *(paricaya prjñāpikasaṃjñā)*, and the other, on their therapeutic properties *(guna prajñapikasaṃjñā)*. For instance, *Sesbania* was called *vakra puspa* (curved *corolla*) and *vraṇāri* (curing of boils). Similarly, *Ricinus communis* was called *citra bīja* (ornamented seed) and *vātāri* (curing rheumatism).

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Systematic aspects in Amarakośa

The *Vanauṣadhivarga* of *Amarakośa* identifies plants under three categories, viz, *Vānaspatya, Vanaspati* and *Oṣadhi.* Besides, it makes a mention of mushrooms (*citra, aticatra* and *phalghna*). Parasites (*Vanda* and *Vṛkṣādani*) and epiphytes (*Vṛkṣāruha* and *jīvantika*) have also been mentioned in this text.

Kṣīrasvāmi, a commentator of *Amarakośa*, has analyzed these words etymologically so as to bring out their true characters. According to him, *Vṛkṣādani* means 'that which kills the tree of its origin' (this definitely refers to the parasites). *Vṛkṣāruha* means that which simply grows on a tree (refers to epiphytes).

Description and taxonomic identification : As a lexicon, *Amarakośa* has collected all the synonyms for a plant, mentioning that they all refer to a single plant. Etymological analyses of these names indicate that they are based on different characters of the plant, and perhaps were in usage in different areas. The collection of all these names would in a way serve as a gross taxonomic description of a plant.

One or two examples will clearly underscore the significance of what is mentioned above. The tree *Alstonia* of the family *Apocynaceae* has the following names :

Sapataparṇi	:	seven leaves (leaflets)
Viśālatvak	:	wide bark
Śārada	:	flowers during *Śaradṛtu*
Viṣamacchada	:	dissection of the leaflets is unequal

The country fig, *Ficus glomerata*, of the family *Moraceae*, is described as follows :

Udumbara	:	has a bark or skin that peels off
Jantuphala	:	with flies inside the fruit
Yajñāṅga	:	the branches of the tree form a part in the rituals in the sacrificial fire (*Yajña*).
Hemadhugdhaka	:	the tree on wounding yields golden coloured milky latex.

The collection of the names given above and their analysis would serve as a tolerably good description of plants and helps in their identification.

According to Seal (1915), the inclusion of bamboo with grasses in the listing of names is a pointer to their relationship. Similarly, the categorization of coconut, date palm, areca, pandanus, etc, under the group *Tṛṇa druma* reveals the knowledge of a general type of relationship among them.

Vṛkṣāyurveda of Parāśara

The two categories of plants, as mentioned in this text, namely, *Dvimātṛka* (Dicotyledons) and *Ekamātṛka* (monocotyledons), and their characteristics have been referred to already. This text has a chapter on flowers called *Puṣpāṅga sūtrādhyāya*, which describes flowers and its various organs. The relationship between the *śalāka* (Thalamus) and *bījadhara* (gynoecium) is the basis of classification of the flower into the following four types:

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Tuṇḍapuṣpamaṇḍala — Hypogynous flower
Kumbhapuṣpamaṇḍala — Epigynous flower
Tungapuṣpamandala — Perigynous flower
Vatyapuṣpamaṇḍala — Flowers in which stamens are well above the gynoecium (Malvaceae)

Classification of families : Parāśara has also classified the flowering plants into various families which surprisingly are in agreement with the modern method. Some of the families mentioned by him are :

Śamiganiya	:	Leguminosae
Pupilikaganiya	:	Rutaceae
Svastikaganiya	:	Cruciferae
Tripuṣpaganiya	:	Cucubritaceae
Mallikāganiya	:	Apocynaceae
Kūrcaganiya	:	Compositae

The families, Leguminosae and Cruciferae, need to be discussed here to some extent to understand how their characters have been described in this ancient text.

The characters of Leguminosae (flowers) are : hypogynous (*tuṇḍamaṇḍala*); unequal corolla lobes (*viṣamavidala*); five free petals (*pañcamuktadala*); synsepalous calyx (*yuktajalika*); Tenstamens (*daśābhi kesara*); legume fruit with seeds attached to a side (*simbiphala*), (*pārśvabīja*). There are floral variations in Leguminosae like *vakrapuṣpa, vikarṇikapuṣpa* and *śukapuṣpa*, corresponding to *Papilionaceae, Caesalpinaceae* and *Mimoceae* respectively—a remarkable identification.

The characters of the family Cruciferae, as described in this text, are (flowers) : hypogynous (*tuṇḍamaṇḍala*); recemose inflorescence (*pañktibandhana*); calyx is cross-wise (*jālakaṃ svastikākāraṃ*); four free petals (*chaturdalam muktaṃ*); six free stamens (*ṣaṇmukta kesara*) of which two are short (*dve kharva kesara*); fruit splits into two (*phalaṃ dviputaṃ*) and is like legume (*sadṛuśaṃ śamīphalam*) but attached to a replum (*sandhitam phalavalkalam*).

Use of taxonomic survey in the botanical identity of plants

A systematic survey of botanical literature in Sanskrit and other Indian languages is very important to properly understand and analyse the level of botanical knowledge and the variety of flora in ancient India. It will also help us to identify and prepare an inventory of plants which are truly indigenous to India. A work of this type will specially benefit Ayurveda in which medicinal plants or herbs play a significant role. In order to study and identify the Sanskrit names with modern botanical names, the following steps are necessary :

(i) A comprehensive knowledge of Sanskrit and its grammar is necessary, because many a time in the description of plants one should know where the different words

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separate or conjugate; (ii) History of the concerned plant as well as of the geographical knowledge of the area, where the plant has been described as originally growing, would be necessary because the plant in question may show some variations if it is growing in a different area and it may not exactly fit in with the description given in the literature; (iii) One should thoroughly understand the total botanical characters of the plant; (iv) The total life history of the plant should be understood because in the (medical) literature, only that stage of the plant (in the life cycle) is described in detail when its medicinal properties are at the maximum. For instance, in one of the plants (*Jīvaka*) mentioned in *Bhāvaprakāśa*, the leaves have been described as thin (*Sūkṣma patraka*). The leaves indeed are thin in the mature plant when it is used in medicine. In the young plants, the leaves are thick. Hence, if one has only a young plant and compares the characters of the plant with the description, there is every chance that he will think that the plant in question is different from the one mentioned above. But a complete understanding of the life-history of the plant will surely help. It should be noted that ancient Indian literature is very rich in information concerning plant science and specially in taxonomic information.

ECOLOGY AND ENVIRONMENT (INCLUDING FORESTS)

Environmental awareness, conservation of flora, and protection of forests have been a part of Indian tradition since time immemorial. In addition, scientific study of ecological principles, interaction between plants and plants, and plants and microbes have been described in a number of Sanskrit texts.

Caraka, in the chapter *Kalpasthāna* of the *Caraka saṃhitā*, has classified the soils, based on the nature and the types of plants grown into the following categories: (i) *Jāṅgala* (arid land). These are characterized by scarcity of water and arbour of trees such as *Khadira (Acacia catechu), Sāla (Shoria robusta), Badarī (Zizyphos jujuba),* and the like; and (ii) *Anūpa* (watery, marshy) : Abundance of moisture characterizes this region. According to Varāhamihira, the trees that grow here are *Jambū (Eugenia jambolana), Vetasa* (*Calamus rotang), Kadamba (Anthocephalus cadamba), Arjuna (Terminalia arjuna),* etc; and (iii) *Sādhāraṇa* (normal). This is characterized by neither scarcity nor abundance of water. This region supports a number of plants.

The above classification almost comes close to the categorization of *Xerophytes (Jāṅgala), Hydrophytes* or marsh plants *(Anūpa)*, and *Mesophytes* (*Sādhāraṇa*) in modern ecology.

Kauṭilya's *Arthaśāstra* (4th cent. B.C.) is a work dealing with a number of aspects of state-craft that a King should be familiar with. Significantly, botanical knowledge and, in particular ecology and conservation, have been extensively dealt with in a number of chapters of this important treatise. In the chapter, *Janapadaniveśa,* Kauṭilya mentions that the following trees should mark the boundary between different villages. The trees to be grown are : *Śālmalī (Salmalia malabaricum), Śami (Prosopis specigera), Nygrodha (Ficus bengalensis),* and the like. *Kauṭilya* also mentions that uneven terrain with stones and rocks is not suitable for cultivation, but should be used as grassland, where grazing by

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cattle should be allowed. In fact, he has recommended the appointment of an authority for the management of grasslands, calling the person-in-change, *Vivītādhyakṣa.* One of the duties of *Vivītādhyakṣa* is to arrange for the creation of waterholes and cultivation of trees on this type of land so that it develops into a useful piece of land earning revenue for the king.

In the chapter, *Bhūmichidravidhāna*, Kauṭilya has advocated the growing of forests for different purposes : (i) Forest for Brahmins to perform sacred rituals as well as to perform *tapas* (meditation); (ii) Forest for hunting purposes; (iii) Establishment of a national park to protect all kinds of animals; (iv) Mono-culture forests with different types of trees (this can be exploited for use in a planned way); and (vi) Establishment of *Nāgavana* for protecting wild elephants, which is to be protected on one side by hilly terrain, and must have good water source. No tree should be cut in this forest. Kauṭilya also prescribes penalties for killing elephants. Poachers are to be given death penalty. Those who steal ivory from dead elephants are to be fined heavily. *Nāgavana* can be used only for capturing and taming elephants.

There is also a chapter in the *Arthaśāstra*, which exclusively deals with forests. The chief of the forests is called *Kupyādhyakṣa,* who should deal with the maintenance of forests and collection of forest produce. The chapter mentions penalty for cutting trees, without permission.

In the chapter on agriculture, Kauṭilya mentions the amount of rainfall in *Jāṅgala* as 16 *droṇa* (a measure of rainfall), while it is 24 *droṇa* in *Anūpa* region.

Sūnādhyakṣa, though is an officer involved in the supply of meat, is also concerned with the protection of wild animals in the forest. There are details of penalty to be imposed for killing wild animals. The penalty is less for first time (*apravṛtta vadha)*, and for habitual offenders (*Pravṛttavadha)* the penalty is more. *Abhayavana* is a protected forest in which wild animals should not even be captured, let alone killed.

Parāśara's *Vṛkṣāyurveda*, in the chapter titled, *Vanavarghādhyāya,* gives names, descriptions and distribution of forest types. The names of forests are—*Caitrarathavana, Kalakavana, Kirātavana, Pañcanandavana, Prācyavana, Vedikaruṣakavana, Angīreyavana, Kalingakavana, Daśamakavana, Aparāntavana, Saurāṣṭravana*, etc.

The *Amarakośa* of Amarasimha, in the chapter, *Vanauṣadhivarga*, gives an account of various types of forests, both natural and sylvicultured.

Aṭavi, Araṇya (forests); *Gṛhārāma, Niṣkuṭa* (kitchen garden); *Ārāma, Upavana* (public garden); *Kṛtrimavana* (sylvicultured forest); *Vṛkṣavāṭikā* (pleasure grove) ; *Krīḍodyāna* (royal garden); *Pramadavana* (royal garden attached to haven). The *vanauṣadhivarga* of *Amarakośa* has also listed nearly 270 wild plants (herbs, shrubs and trees) with their synonyms.

HORTICULTURE; ARBORICULTURE

The science of horticulture, arboriculture, which deals with the development and maintenance of parks, and the propagation and improvement of trees had been regularly practised in ancient India.

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Amarakośa mentions a variety of garden parks that were established for specific purposes (see also in the section on ecology for details). Even *Vātsyāyana*, the author of *Kāmasūtra*, speaks of pleasure gardens surrounding palaces. *Vṛkṣāyurveda* text also speaks of the construction and maintenance of gardens for public health, recreation and enjoyment. Even the *Rāmāyaṇa* refers to *madhuvana*, a garden. Public gardens and parks were under the direct supervision of officers with the requisite knowledge of *Vṛkṣāyurveda*, and who were also experts in seed propagation, grafting and related techniques.

In the *Vṛkṣāyurvedādhyāya* of the *Bṛhatsaṃhitā, Varāhamihira* (6th cent. A D) has given a detailed account of various horticultural practices. According to *Varāhamihira*, the purpose of establishing gardens is to beautify the surroundings and maintain shade particularly near lakes and ponds. His list of plants that are suitable for a garden include *Ariṣṭa* (*Sapindus saponifera*) ; *Aśoka* (*Saraca indica*); *Punnāga* (*Ochrocarpus longifolius*); *Śirīśa* (*Acacia sirissa*); and *Priyaṅgu*. Interestingly, Varāhamihira has also given an account of vegetative propagation (*kandāropaṇa*) as well as transplantation as follows:

Methods of vegetative propagation or transplantation

The author mentions the names of various trees from which the branches could be cut off either at the base or at the nodal region, and the cut-off ones must be immediately pasted with cow dung and then planted in the soil. The trees mentioned by him are:

Panasa	*Atrocarpus integrifolia* (Moraceae)
Aśoka	*Saraca indica* (Caesalpinaceae)
Kadalī	*Musa paradisiaca* (Musaceae)
Jambū	*Eugenia jambolana* (Myrtaceae)
Lakuca	*Atrocarpus spp.* (Moraceae)
Dāḍima	*Punica granatum* (Punicaceae)
Drākṣā	*Vitis vinifera* (Vitaceae)
Bījapūra	*Citrus media* (Rutaceae)
Palivaṭa (*Paravda*)	*Psidium guzava* (Myrtaceae)
Atimuktaka	*Agnasoma caryophylata*

The author has also given the appropriate time for transplanting the trees of various ages. If the plants are very young with a few or no branches, they should be transplanted in the early winter season, whereas such plants as have already emerged branches should be transplanted in late winter, while plants with very well-developed branches should be transplanted in the rainy season.

Treatment for a tree to be transplanted

Before the transplantation, a tree should be treated as follows: equal quantities of ghee, *uśīra* (roots of a medicinal grass—*Andropogon muricatus*), *tila* (sesame), kṣaudra (honey obtained from a smaller variety of honey bee), *viḍaṅga* (fruits of *Embelia ribes* of

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Myrsinaceae family), *kṣīra* (milk), and *gomaya* (cow dung) are to be mixed and made into a paste. The tree that is to be transplanted must be anointed with this paste first. There is also a ritual, namely, the person who is to carry the transplantation must be clean, and he must worship the tree before transplantation. If this is done, the trees surely survive with their own old leaves. The newly transplanted trees must be watered regularly, twice (once in the morning and once in the evening) in summer, and on alternate days in winter and, if it is rainy season, only when the soil dries up.

Distance to be maintained between trees: Varāhamihira also mentions the ideal, average and unsuitable distance, to be maintained between the trees. The ideal (*uttama*) distance between trees is *vimśatihasta* (assuming a *hasta* distance to be a foot or a little more, it means about 20 to 25 feet), if not a very good distance; *madhyama* is *śoḍaṣa* (or 16ft), while the unsuitable (*adharma)* distance is *dvādaśa* (12ft). The author further mentions that if the trees are planted close by, they will be touching each other, and hence there will be improper growth and the production of fruits will be less.

Vārāhīsaṃhitā has also categorized two types of propagation—transplantation (*Pādapasamropaṇa)* and grafting *(Kandāropana)*. Another text, the *Upavanavinoda*, gives a detailed account of transplantation and the preparation of pits to transplant the trees. The pits, according to this text, should be filled half of their depth with fine soil, and watered adequately when the pot will be ready to receive the tree.

EVOLUTION

Even though it is assumed that basically the Hindu philosophy speaks of creation, there are several passages in the *Vedas,* the *Upaniṣads* and other texts which throw light on the gradual diversification of the biological world.

The following passage of *Chāndogya Upaniṣad* gives an idea of gradual evolution in the living world including human beings.

Tasmādātmanaḥ ākāśaḥ sañjāyate, ākāśāt vāyuḥ, vāyoragniḥ, agnerāpah, āpaḥ Prthvī; Pṛthivyā oṣadhayah; oṣadhibhya annaṃ; annāt retah; retasā puruṣaḥ. (From Ātman '*ākāśa*' is produced, from '*ākāśa*'—air, from air—fire, from fire—water, from water plants from plants—food, from food—vitality, from vitality—man)

The *Bṛhadviṣṇupurāṇa* says that from immovables water-borne organisms *(jalajaṃ-navalakṣaṃ)* came into existence, and then came birds, followed by animals. It is interesting to note that the *Bṛhadviṣṇupurāṇa* mentions monkeys as last but one stage in the evolution before giving rise to human beings.

The idea of evolution also finds a mention in the *Bhagavadgītā*. In the second chapter, it is stated that when Arjuna throws off his *gaṇḍīva* bow and refuses to kill his kith and kin for the sake of kingdom, Lord Kṛṣṇa, while exhorting Arjuna to fight, exclaims as follows : *Avyaktādīni bhūtāni vyaktamadhyāni Bhārata* (the biological world was microscopic or unmanifest in the beginning, and only later it became manifest or macroscopic). This is in tune with the evolutionary theory, which states that life expressed itself initially in the form of microbes and only later multicellular organisms came into existence.

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ANATOMY

Anatomical details of plant organs such as cells, tissues and tissue systems were known to the ancient Indians at least in an elementary manner. The *Bṛhadaraṇyaka upaniṣad* gives a comparison between a human body and a tree. The five regions present in a plant comparable to those of the human body are: *tvak* (skin or bark), *māṃsa* (soft tissues); *asthi* (wood or xylem), *majjā* (pith), and *snāyu* (fibres both xylem and sclerenchyma).

The *Vṛkṣāyurveda* of Parāśara reveals the knowledge of anatomical details of leaf that was prevalent in as early as the first century B C. Such details seem to have been discovered (or rediscovered) as late as in the 17th century A D. According to Parāśara, there are tissue systems meant for the transportation of nutrient and sap. The whole of the vascular system has been given the name *sarvasrotāṃsi* (that which helps in the flow of all). This is classified into two categories, namely *syandana* and *sirājāla.* Between them, *syandana* indicates the transportation of *rasa* absorbed from the Earth (*Pṛthvī*) to all parts of the plant body, while *sirājāla (pl. sirājālāni)* helps in the re-distribution of nutrition from the leaf to other parts of a plant. The *syandana* obviously refers to xylem, and *sirājāla,* to phloem. Parāśara observes that in the vascular system, there is both upward and downward movements (*sirābhiśca upasarpayanti apasarpayanti ca)*. He further observes that because of the flow of the sap, plants obtain nutrition (*santarpayante)* and grow *(vardhayante)*.

Perhaps, the most remarkable anatomical observation made by Parāśara relates to a detailed description of the plant-cell (much more detailed than that of Robert Hooke of 17th cent. (who is credited with the discovery of cell).

While describing the internal structure of the leaf, Parāśara notes that it consists of innumerable compartments filled with sap (*patre rasakośāḥ aparisankhyeāḥ santi*). They are the store-house of sap (*rasāśrayāḥ*). They are covered by means of a boundary-cell wall or cell–membrane (*kalaveṣṭana*). They have five elemental principles (*pañcabhautika guṇasamanvita)* as well as a colouring principle (*ranjakayukta*), and are not visible to the naked eye, i.e., extremely minute (*aṇava*). The boundary is extremely thin (*sūkṣma patraka*), and originates from a fluid (*kalalādupajayāte*) which may correspond to what we call now the protoplasm.

The above description of a living plant-cell with an account of details such as cell wall/membrane, protoplasm, chlorophyll, etc, is almost close to the modern description of plant cell and far ahead in details than what Robert Hooke has described. Such a detailed and accurate description of a microscopic structure as plant cell, even so, at such a remote period, has made many botanists doubt as to how could Parāśara describe so many details without the help of a microscope. If we take a sceptical view, one can argue that it could be sheer imagination or intuitive observation. But within the description itself, Parāśara makes amply clear the methodology of his observation. The description that the cells are not visible to the naked eye (yet, Parāśara describes the microscopic structure) is proof enough that the details are borne out of careful scientific observation. One may wonder as to whether Parāśara had the means of instrumental magnification (though not a microscope in the modern sense). In this connection, it is worthwhile mentioning that *Caraka saṃhitā*, which belongs to the same period, gives a descrition of

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blood corpuscles—*aṇavaḥ, vṛtttaḥ, apādaḥ,* etc (invisible to naked eye, circular, without any appendages, etc).

The above observation must necessarily lead to a conclusion that those who intensively studied plants at that time might have had recourse to some form of magnifying aid; otherwise, such an accurate description of blood corpuscles and plant cell would not have been possible. Further research on this technological aspect will surely throw light on the possible types of instruments which were in vogue in ancient India.

PHYSIOLOGY

The basic functioning of the various parts of a plant and (perhaps) the mechanism of those functions were known to ancient Indians as evidenced by several references to them in some literary sources.

"*Vṛkṣādayaḥ pratiniyatabhokradhisthtaḥ. Jīvanamaranasvapnajāgarana roga bheṣaja-prayoga sajātīyānuvidyānukūlāḥ upagama pratikūlapogama-dibhyah pratiddhaśariravat*".

Udayana, in his *Pṛthvīnirūpaṇaṃ*, says: (In plants, there is life, death, sleep, waking, disease, drugging, transmission of specific characters by means of ova, movement towards what is favourable and away from what is unfavourable).

The Jaina writer Gunaratna, in his commentary on *Ṣaḍdarśanasamuccaya,* gives an account of the following characters of plant life :

(i) Stages of infancy, youth and age
(ii) Regular growth
(iii) Various kinds of movement or action connected with sleep, waking, expansion and contraction in response to touch and movement towards a support.
(iv) Withering on wound or laceration of organs
(v) Growth or decay by assimilation of suitable or unsuitable food, as prescribed in the science of the disease and treatment of plants (*Vṛkṣāyurveda*)
(vi) Assimilation of food, according to nature of the soil
(vii) Disease
(viii) Recovery from wounds and disease by the application of drugs
(ix) Dryness or the opposite due to the sap
(x) Special food favourable for impregnation

Śaṅkaramiśra in his *Upaskāra* notes that after a wound or laceration, there is natural recuperation due to the growth of organs (*bhagnakṣatasamrohaṇa*).

The *Śāntiparva* of *Mahābhārata* enumerates several physiological principles including the sense of touch, hearing (response to sound), vision, smell, irritability, etc, in respect of plants. Another interesting observation in the *Śāntiparva* is the succinct explanation of the phenomenon of the ascent of sap with even an observation on its mechanism as follows:

Vaktrenotpalanalena yathordhvam jalamādadeti
Thatā pavana samyuktah pādaih pibati pādapaḥ.

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(The tree sucks water from its base (roots) with a force, and along with air, water is drawn up the tree.) The fact that the force for the upward movement of water is generated in the aerial parts is very well illustrated with an analogy: 'If you cut the petiole of lotus dipped in water and suck from the mouth, then water is forced up, in the same way water is drawn up in trees'. This explanation (along with an experimental evidence) clearly reveals the ancient Indian knowledge regarding the ascent of sap in plants. This explanation is in the nature of an anticipation of the transpiration pull theory of Dixon and Joly (1894).

The nutritive value of absorbed water and its role in plant metabolism is clearly illustrated in another verse of the *Śāntiparva*: *'Tena tajjalamādattam jarayatyagnimārutai āhāraparināmācca snehovṛiddhiśca jāyate'.* (The water absorbed by the plant is converted into food under the influence of *agni* (energy) and *māruta* (air), and due to this, plant can grow). Is it not a rudimentary knowledge of photosynthesis?

The aspect of food preparation in the leaf is explained in detail in the *Vṛkṣāyurveda* of Parāśara, which says that the watery sap obtained from earth *(pārthivarasa)* is transported from roots up to the leaf through *syandana* (xylem). There it gets digested with the help of the colorific principle of chlorophyll (*rañjakena pacyamānāt*) into nutritive substance and a by–product *(malaṃ)*. The relevant passage is as follows :

Tato mūlebhyah pārthivarasāḥ syandanībhi samplavante patreṣu. tatra rañjakena pacyamānāt yanmalaṃ nigachati tadūṣmā bhavati.

The absorption and movement of water finds a mention in Ṣankaramiśra's *Upaskāra* also. It states in the form of a question that water poured at the roots goes up in all directions through the interior of a tree. Neither impulse, nor impact, nor the sun's rays prevail there. How then is it caused'? The exudation of sap from the stem has been mentioned in the *Rājānighaṇṭu,* and the stages of growth in plants, starting from its birth, infancy, youth, etc. have been described. There have also been estimations about the age of the trees. The maximum age of a tree is given as ten-thousand years *(daśasahasrāṇyutkṛṣṭamāyuh)*!

Several Sanskrit texts deal extensively with the movements seen in plants. The reason for the movement has also been given. It has been mentioned that plants show movements towards a direction which is favourable to them, and move away from a direction unfavourable to them *(sajātīyanubandhanūkūlopagamapratikūlāpagamādibhyah)*. Sleep movements in plants, when the leaves fold up during night has also been observed (*ratrau patrasaṃkocaḥ*). Sensitiveness to touch in 'touch-me-not' plant (*Mimosa pudica*) is clearly described as *lajjālu pravatnaṃ hastādi saṃsparśāt patra sankocādikaṃ.* In fact, the name *Namaskarī* given to the touch-me-not' plant (the term *Namaskarī* means that which holds its hands; here leaves) is a clear indication of the movement of leaves.

The opening of the flowers at different times during a day—morning or evening—has also been observed as follows:

Padmādīnām prātarvikasanaṃ, gosatyakādi puṣpanam ca sandhyayaṁ kumudādīnāṃ tu candrodaye.

Germination: Germination of a seed is given the name *aṅkurodbheda* i.e., the coming out of the embryo piercing the seed. For proper germination, the importance of season,

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water and good soil were recognized. In his commentary on *Ṣaḍdarśanasamuccaya*, Gunaratna observes that the seeds of banyan, *Aśvattha* and *Niṃba* sprout during the rainy season under the influence of dew and air *(Śiśiravāyu saṃsparśad aṅkurodbhedaḥ)*. The term *uttānapāda,* used during germination of the seed, is significant as it is the radicle (foot-basal region) that comes out first.

Consciousness in plants. Ancient Indians believed that plants as living organisms possess conciousness, but it is dormant and not comparable to that in animals. Manu, the law giver, writes that hey have a latent conciousness, which is capable of perceiving both pleasure and pain (*antassanjñā bhavantyete sukadhuhkha samanvitāḥ*).

According to the *Śāntiparva* of *Mahābharata,* life, touch, feel, smell, vision, and even the sense of hearing are present in plants. In conclusion, the *Śāntiparva* says—*Jīvaṃ paśyāmi vṛkṣanāṃ acaitanyaṃ na vidyate.* Even Udayana, in his *Kiraṇāvalī* notices that plants have a dull manifestation of senses (*atimandānta saṃjñitā*).

SEXUALITY, HEREDITY AND GENETICS

A detailed study of Sanskrit literature, specially of the texts dealing with plants, indicates that the idea of sexuality in plants was rather vague. Even though the male and the female parts of flowers have been described, it is doubtful whether their role in the reproduction of plants was understood.

Caraka, however, distinguishes male-female individuals in the plant called *Kuṭaja (Hollerhina antidysenterica)*. The variety with white flowers and large fruits was regarded by him as male, and the other which bears red or yellow flowers and small fruits, as female.

Nevertheless, the problem of transmittance of characteristics from parents to the offspring had indeed been thought of by ancient Indians, even though they were not in a position to unravel the secret of heredity. In the *Bṛhadāraṇyaka bhāṣya,* the great philosopher, Śaṅkara, wonders as to how specific characteristics are transmitted? Why do the offspring of a horse, *Aśvattha* or a human being, look like their parents? Caraka holds that all organs are potentially present in the fertilized ovum and they unfold in a certain order.

The *Rājānighaṇṭu* mentions the existence of male and female plants in the plant, *Ketaki (Pandanus odoratissimus)*. The male plant is referred to as *sitaketaki,* and the female one, by *varṇa ketaki*.

PLANT PATHOLOGY

The literary sources reveal the significant ancient contributions in the study and treatment of plant diseases. It may be asked whether references to plant diseases and their treatment also are available in the Vedic literature. The *Atharvaveda* mentions the destruction of corn due to insect pests. Sāyaṇa's commentary on the *Ṛgveda* gives an account of various insect pests. In the Buddhist *Vinaya* texts, there is a mention of blight and mildew

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diseases. A much later text, *Śukranīti*, gives an account of the danger to grains by various agents such as fire, snow, worm, insect, etc. Guṇaratna, in his *Śaḍdarsanasamuccaya*, observes that plants are afflicted by diseases, withering of flowers, fruits, leaves, etc., in the same way as human beings suffer from diseases. He further describes that plants do respond to treatment in the same way as human beings.

Varāhamihiraś *Bṛhatsaṃhitā* gives a classification of diseases, and opines that these are caused by the variations of environmental conditions. The relevant *śloka* is as follows: *Śītavātapaih rogo jāyate pāṇḍupatrata; avṛddhiśca pravālānāṃ śākhāśoṣo rasasrutiḥ.* (Because of the impairment of temperature—*śīta* and wind—*vāta,* four types of diseases are caused. These are *paṇḍu patratā*—yellowing of leaves or chlorosis, *pravāla avṛddhi*—falling off of buds, *śākhāśoṣa*—drying up of the branches, and *rasasruti*—exudation of sap or gummosis).

The *Upavanavinoda* devotes a whole section to the identification and methods of treatment of plant diseases. Kaśyapa, an authority (*Kaśyapa saṃhitā)* on agriculture, has described even the diagnosis of the plant diseases. The remedies suggested by him include removal of affected parts, and the treatment for wounds, etc.

Varāhamihira, in his *Bṛhatsaṃhitā* (*Vṛkṣāyurvedādhyāya*) suggests the following: "In order to treat the disease, a paste of *ghee, viḍaṅga* (*Embelia ribes*) and silt should be applied to the infected parts only. Milk mixed with water should be sprinkled over the area, subsequently".

Even barenness (non-production of flowers and fruits) was regarded as a disease, and a number of measures have been suggested to cure this malady. According to Varāhamihira, if a tree is not producing flowers and fruits, the following treatment should be given: 'Mix the ingredients like *kulatha* (horsegram), *māṣa* (blackgram), *mudgara* (greengram), and *tila* (sesame) in milk. Cool the mixture and sprinkle it on the trees'.

Measures to increase the growth of trees

Manuring of plants and trees was well-known. Varahamihira mentions the use of manure to increase the growth of trees and gives the method of its preparation as follows: 'Dried and powdered dung of *avika* (sheep) and *aja* (goat)—two measures; *tila*, sesame—one measure; *saktu* (zinc compound)—a little quantity; a small quantity of *gomāṃsa* (flesh of cow), and the required quantity of water should be kept in a vessel for seven days. On the eighth day, the mixture should be applied to the trees. Such an application of manure to trees or creepers will make them flower, fruit and grow healthily.

Seed treatment: In order to get healthy and good-yielding trees, the importance of treating their seeds suitably was known. According to Varahamihira, the seed should be smeared with *ghee* and immersed in milk for some time. It should then be taken out and dried, and again the process be repeated, and this should be done for ten days. Subsequently, the seed should be mixed with cow-dung, flesh of pig and deer, and sown in the soil, which should be watered with a little quantity of milk.

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AGRICULTURE

Thanks to Indus Valley Civilization or Harappan culture, India has a rich heritage in agricultural practices. Domestication of animals to help in agricultural activities was very well-known in ancient India. As in the other culture-areas, the history of agriculture begins with the agricultural practices of the Indus Valley Civilization or Harappa Culture (c.3000 B.C.) The fertile soil, plenty of rainfall, and the perennial water of the Indus river were conducive to the growth of domesticated plants.

The Vedic Indians primarily depended on agriculture for their livelihood. Domestic rites were synchronized with the four main agricultural operations, viz., ploughing, sowing, reaping and thrashing. A *Ṛgvedic* hymn offers prayers to the divinity to bestow favours so that, "the cattle be happy, plants be sweet, the plough furrow happily....." Later, in the *Atharvaveda,* there are a number of hymns addressed to the God of rain and cattle to bestow favours so that the harvest would be bountiful, and cattle wealth would increase.

The Vedic word for agriculture is *kṛṣi*, which means ploughing. Crops such as wheat, barley, rice, sugarcane, lentils, etc. used to be cultivated during Vedic times. Agricultural implements mentioned in the Vedic texts include—the plough (*lāṅgala*), sieve *(titum*). *Urdara* was drawn by oxen in teams of six or even eight. Cowdung (*śākṛt*) was mainly used as the manure. The *Kāṭhaka saṃhitā* describes cultivation and harvesting using plough as well as sickle. There are evidences to indicate that the Vedic people practised crop rotation.. The *Taittirīya saṃhitā* mentions that rice should be sown in summer and pulses in winter in the same field, and thus there used to be two harvests per year during the Vedic period.

Among the domesticated animals, bull, oxen, sheep, goat and cow are mentioned frequently in the *Vedas.* The cow in particular was held in high esteem, and was compared to mother earth. The varied references to agriculture in Vedas are indicative of the fact that the Vedic people knew all aspects of agriculture including the fertility of land, selection and the treatment of seeds, seasons of sowing and harvesting, rotation of crops and other practices such as manuring. In the post Vedic-period, agriculture occupied an important place in human endeavour as evidenced by a number of texts and textual references to agricultural practices. Among the ancient texts which deal with agriculture are the *Arthaśāstra* of Kauṭilya and the *Kṛṣiparāśara* of Parāśara.

Kauṭilya classifies the land as follows—*Kṛṣṭa* (cultivated), *akṛṣṭa* (un-cultivated); *sthala* (elevated and dry ground), *kedara* (field sown with crops) ; ārāma (grovel) ; *sanda* (horticultural plantation) *mūlavapa* (field for growing roots) ; *vata* (sugarcane plantation), *vana* (forest); *vivīta* (pasture land) and *pathi* (roads). Agriculture was given the pride of place as can be seen from a detailed account of it in the *Arthaśāstra.* In the chapter *Sītādhyakṣa* of this compendium, several aspects of agriculture have been mentioned. The department of agriculture was under the supervision of a Director/Superintendent. *Sītādhyakṣa* who was well-versed in *Kṛṣiśāstra, Śulbaśāstra* (soil science) and *Vṛkṣāyurveda.* He was assigned the task of directing the types of fields—irrigated or non irrigated. Varieties of rice like *śāli* and *kodrava,* sesame, *priyaṅgu daraka* and *varaka* are to be the first sowings; *mudga,* (horsegram), *māṣa* (blackgram) and *saimbya* are to be the middle

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sowings; and safflower, lentils, horsegram, barley and wheat are to be the last sowings, according to the *Arthaśāstra*. The text also has details regarding the seed treatment before the seeds become fit for sowing. The seeds are to be subjected to the action of dew (night) and dried in the sun (during day) for about a week. Honey, ghee, pig fat, cow-dung and the like are to be treated with fresh acrid fish along with the latex of *snuhī* (*Euphorbia antiquorum*).

The *Arthaśāstra* also deals with land revenue, water-cess and related payments to be paid by farmers to the state. Water lifted from tanks etc. are to be paid at the rate of 20% (of the produce).

The *Bṛhatsaṃhitā*, in its chapter titled, *Vṛkṣāyurvedādhyāya*, mentions the importance of green manure. Hemp (*Crotelaria juncea*) and sesame plants are to be ploughed back into the soil to increase the fertility. In another verse of this chapter, it has been mentioned that 'to promote inflorescence and fructification, a mixture of one *āḍhaka* (64 *palas*) of sesame, two *āḍhakas* of dung of sheep or goat, one *prasta* (16 *palas*) of barley powder, one *tola* of beef thrown into one dram of water and standing over seven nights should be poured round the roots of the plant'. In order to promote luxuriant growth of the plant, the *Bṛhatsaṃhitā* gives details of a method of seed treatment as follows: 'The seeds should be soaked in an infusion of paddy powder, blackgram, sesame and barley, which are to be mixed with decomposing flesh, and the whole mass steamed with the infusion of turmeric'.

Agnipurāṇa also has a recipe for increasing soil fertility: 'A tree becomes laden with flowers and fruits by manuring the soil with powdered barley, sesame and dung of goat mixed with washings of beat and soaked for about seven nights'.

The *Kṛṣiparāśara*, one of the important treatises on agriculture, says : "In the month of *Māgha*, a dung heap is to be raised with the help of a spade. When it gets dried in the sun, smaller balls are to be made out of it. In the month of *Phālguṇa*, the dried balls are placed in a hole dug in the field, and at the time of sowing they are scattered into the field."

To carry out the agricultural operation properly, obviously, there was a need for a variety of agricultural implements. The plough has been mentioned right from the Vedic literature onwards. The *Amarakośa* mentions an extensive array of agricultural implements in the section called *Śūdravarga*. These are plough (*lāṅgala, helā*), pin of yoke (yugakīlaka), shaft of the plough (*lāṅgala daṇḍa*), goad (*todana*), harrow (*koṭiśa*), spade (*khanitra*), sickle (*datra*), post for threshing the grain on the floor (*medhi*), winnowing basket (*śūrpa*), and sieve (*titum*). According to *Kṛṣiparāśara* which also gives a detailed account of plough, a plough consists of the following parts—*yuga* (yoke), *addacalla* (pin of the yoke), *īśa* (pair of the plough), *niryola* (rod of the plough), *śaula* (an extra piece of wood that fixes the *niryola* to the plough), *niryolapāśika* (plates), *halasthāṇu* (piece of wood fixed to the *niryola*), *paccani* (goad made of bamboo with iron top), and *abandha* (iron rod which prevents *niryola* from getting out of the pole).

Irrigation

The usage of the words like *nadīmātṛka* (using river water for agriculture) to classify the cultivated fields clearly indicates that irrigation was in practice in ancient India then as

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now. The *Arthaśāstra* (chapter 45, *sītādhyakṣa*), in fact, mentions different tax rates for irrigated and non-irrigated lands. Water obtained from tanks or ponds is to be taxed (20% of the crop). If water is obtained from rivers using mechanical means (*yantraviśeṣa*), the tax is as high as 25% of the produce. Another text, *Nāradasmṛti,* mentions the construction of dykes for impounding and channelizing water for irrigation. The dykes are classified into *kheya* (dug into the soil to draw off excess water) and *bandhya* (constructed to prevent water from flowing out).

In the eighth century A.D., King Lalitaditya of Kashmir accomplished the construction of a series of water wheels to channelize the seasonal flood waters of *Vitastā* and *Mahāpadma* lakes and used them for irrigation.

Crops

According to the *Bṛhatsaṃhitā,* there were three harvests per calendar year (summer, autumn and vernal). Seeds sown during summer would be ready for harvest during *Śrāvaṇa* (early autumn), and such crops being known as the autumn crop. Seeds sown during autumn yielded vernal crops, and those sown during early spring could be harvested during summer. Crops cultivated during these seasons included rice, wheat, barley, peas, lentil, pulses, spices and vegetables. The cultivated rice varieties included *śāli, kamala, nīvāra, uncha* and *śyāmāka.* The technique of establishing nursery beds and transplantation was also known as evidenced by the fact that *śalī* was cultivated on transplantation. To be effective, agricultural operations needed the complementary animal husbandry to which purposeful attention was also paid. In India, agriculture has been an integral part of the people's life with certain rites and festivals marking the sowing and harvesting of crops.

EPILOGUE

Rational approach, logical thinking, inference based on experiment and observation and openness of mind are the basic parameters on which science is founded. The West can justifiably be proud of establishing these basic dimensions of science. Spiritualism, however, rests mainly on faith and intuition in the ambience of divine revelation, which is mostly abstract. In the West, both science and philosophy or spirituality developed themselves specially after the 18th century as different schools of thought. Even earlier, the story was not different and not unoften they were somewhat antagonistic to each other.

In the Indian context, however, both science and philosophy or spirituality were always considered to be the two sides of the same coin, and were mutually inclusive. Nevertheless, in the Indian tradition, science remained implicit while spirituality was explicit. In other words, Indian ethos had a scientific inner core surrounded by a religious mantle. To the Western mind, conditioned as it was, to think that the temporal (science) and spiritual are basically different and cannot coexist without compromising the basic principles on which they rest, the Indian context (the knowledge system) was puzzling as

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it was an intertwined one, needing in-depth understanding. Hence, several Western scholars were unable to penetrate the shell and reach the core of the Indian knowledge system. It is for this reason that the Western understanding or interpretation of Indian science does not have validity to a great extent. Likewise, it is incorrect to state that, while the Western knowledge is regarded as purposive, the Indian knowledge is rather incidental.

In the context of botany, some Western naturalists think that the entire ancient Indian botanical knowledge is only *Ethnobotany,* meaning that the knowledge (if any) has accrued due to continued contact or practical experience, and not based on any validated scientific concept. This can best be explained by an example. A gardener as well as a botanist can correctly identify a plant; but their methodology is different; while a gardener cannot give a scientific basis for his identification (which is correct), a botanist will give valid reasons and a concept which constitute the basis of identification (i.e., ancient Indian knowledge of botany was equivalent to that of a gardener's).

Thus, the Western mind being unable to go through the maze of Indian knowledge system, even when faced with a correct observation, took the easy course of interpreting it as ethno-botanical.

It is rather unfortunate that the Indian body of botanical knowledge has never been included in the mainstream of global botanical history, and has been even considered as an avoidable appendage. But, a critical evaluation of the botanical knowledge preserved for us in the ancient texts will not fail to reveal that ancient Indians had such botanical insights as may now be called scientific—the concept that plants are also animate, knowledge of the structure and functions of a leaf, systems of classification of plants, the postulate of cell, photosynthesis, and others. What is now needed is an in-depth study of all the literary as well as archaeological sources to understand the scientific dimensions of ancient Indian botany.

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Appendix

LIST OF PLANTS

List of plants in Amarakośa

A list of more than 270 plants have been mentioned with all the synonyms in the four *Vargas* viz., *Vārivarga, Vanauṣadhi*varga, *Manūsya varga,* and *Vaiśyavarga.*

Vārivarga (water plants) : The *Vāri* varga mentions different types of lotuses and water lilies as follows:

Indīvara, Kuvalaya etc.—*Nelumbo nucifera* (*Nymphaceae*) (Gaertn);

Padma, Nalina, Puṇḍarīka etc. *Nymphaea nonchali* (Nymphaceae Burn);

Vanauṣadhi Varga (wild plants): This *Varga* consists of a list of more than 360 plants. In general, the plants mentioned are all wild ones except for a few like coconut, date-palm, areca palm, etc.

In the beginning, trees are mentioned followed by shrubs, herbs, creepers and, lastly the grasses. A few representatives may be mentioned here.

Trees

Important and familiar trees like sacred fig, pongamia, lemon, mango, silk, cotton , sal, teak, fig (wild), dita etc., are mentioned.

Sacred fig (*Ficus religiosa—Moraceae*) : *Bodhidruma, Caladala, Pippala, Kunjarasana, Aśvattha.*

Pongamia (*Pongamia pinnata—Fabaceae*) : *Ciribilva, Naktamala, Karaja, Kārañja.*

Lemon (*Citrus acida—Rutaceae*): *Jambīra, Dantaiatha, Jamba, Jambhāla.*

Mango (*Mangifera indica—Anacardiaceae*): *Āmra, Cūta, Rasāla.*

Silk cotton (*Bombax malabaricum—Bombacaceae*): *Picchila, pūraṇi, Māca, Cirāyu, Śālmalī.*

Sāl (*Shorea robusta—Dipterocarpaceae*): *Sāla, Sarja, Aśvakarna, Saṃvara.*

Teak (*Tectana grandis—Verbenaceae*): *Srīparṇika, Kumudika, Kumbhi, Kaidharya, Kaṭphala.*

Wild fig (*Ficus glomerata—Moraceae*) : *Udumbara, Jantuphala, Yajñāṅga, Hemadugdhaka.*

Dita Tree (*Alstonia scholaris—Apocyanaceae*) : *Saptaparṇi, Viśālatvak, Śārada, Vīṣamachada.*

Shrubs, Herbs, etc.

Chaste plant (*Vitex nirguṇḍi—Verbenaceae*): *Sindhuvāra, Indrasurasa, Nirguṇḍi, Indrāṇika.*

Jasmine (*Fasminum grandiflorum*—Oleaceae): *Sumana, Mālati, Jati.*

Bell flower (*Datura stramonium*—Solanaceae): *Unmatta, Kitava, Dhutra.*

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Poppy plant (*Argemone mexicana*—Papaveraceae): *Dhattūra, Kanakāhvaya, Matula, Madana.*

Cowage plant (*Mucuna pruriens*—Fabaceae): *Atmagupta, Jaha, Vyaṇḍa, Kanḍūrā, Prāvrṣāyaṇī, Ṛṣyaproktā, Śūkaśimbi, Kapikachu, Markaṭi.*

Creepers, Climbers, etc.

Moon plant (*Tinospora cordifolia*—Menispermanceae): *Vātsādanī, Chinnaruhā, Guḍūcī, Tantrikā, Amṛtā, Jīvantikā, Somavallī, Viśāli, Madhuparṇi.*

Ichneumon plant (*Aristolochia incica*—Aristolochiaceae): *Nākulī, Surasā, Nāga, Sugandhā, Gandhanākulī, Nakuleṣṭā, Bhujaṅgākṣi, Chatrākī, Suvahā*

Grasses

Different types of grasses like *Kuṣkus* (*Andropogan muricatus*), sacrificialgrass—*kuśa* (*Poa cynosuriodes*) are mentioned.

Bamboo (*Bamboosa arundanacea)* also finds a place among the grassses. Coconut (*Cocos nucifera*), date palm (*Phoenix dactylifera*), arecanut (*Areca cateehu)* etc., are also included along with the grasses, and they are considered '*Tṛṇa druma*', meaning tree like grasses.

Plants: *rituals and festivals*: There is no denying the fact that Indians, whose ingrained faith is that they are an integral part of nature, have regarded over the millenia the wide and varied plant kingdom as a natural treasure and woven some rituals and festivals around it. One of the most important aspects of Indian traditional rituals or festivals is that it ordains the practitioner to perform certain things, which may seem meaningless from a superficial point of view. But it should be noted that it is not the uselessness of the ritual, but the purposeful character in which the performance of a ritual is undertaken. For instance, mango leaves absorb pollutants of the atmosphere. There seems to be some rationale in mango leaves-infused water being sprinkled on the floor during house-warming and other functions as an anti-pollutant. The same argument perhaps holds good for the practice of having the leaves of milk-weed *(arka)* on the shoulder while bathing during *Rathasaptamī* day. In Gaurī or Ganeśa festival, the deities are to be offered 21 varieties of leaves (*mālati, tulasī, bilva, arka* etc) and flowers (*campakā, ketakī, padma, mālatī, mallikā,* etc)—a sure way of impressing upon a human to acquaint himself with the useful flora, and also preserve the species; likewise, the worship of *tulasi* (*Occimum sanctum*) or its offering to the deities, because it has medicinal properties. Neem is another one which is worshipped along with *Aśvattha* or peepal tree; for, it has extraordinary anti-infectious properties.

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CHAPTER 21

Animal Science and Tradition

M.K. Sridhar

The evolution of modern culture and human civilization is the result of necessity and inquisitiveness, challenges and response, right from pre-historic man who lived in caves to the present advanced human settlements. Tool-making as well as problem-solving capacities of primitive man led to the discovery of hunting, fire, crude as well as polished stone tools, agriculture and animal domestication. The varied interactions and inter-relationships between man and animals around him have been a notable dimension of the societal life, of which he was an integral part then as now.

The gigantic forms of some of the animals, their deadly behaviour, fleeting movements on land, in water and in air, produced in man a fear as well as curiosity resulting in their worship and totemistic cults and taboos. In the process, a divine status was also given to some animals and gradually the anthropomorphic forms of gods led to theriomorphic forms.

An elaborate survey of the gamut of Sanskrit literature reveals that early man had keen interest in nature with its diversified fauna and flora, and was aware to some extent of the knowledge of his environment, animal behaviour, reproductive processes and related aspects. This has culminated in the progress and evolution of different disciplines of modern biology. In any case, animals have become an integral component of human life, be it cultural, religious or social since historic times, in India as elsewhere. The Indian culture-area has its own nuances of man-animal-god relationships.

Interestingly, Vedic people seem to have believed that their ancestors owed their allegiance to some animals descending from the heaven and hence kept even the names of those totem animals. To cite some examples: The clan (gotra)* of *kaśyapa*(tortoise), *jātukarṇya* (old haggard bull), *aja* (goat), *kauśika* (owl), *śunaka* (dog), *vatsa* (calf), *gautama* (ox), *rūkṣas* (bear), *māṇḍūkya* (frog), *bhāradvāja* (a type of bird), *kapi* (monkey), *pṛṣadaśva* (stallion), *hamsajihvā* (swan), *rohiṇa* (a kind of deer), *kapibhuva* (born of

* The word *gotra* is derived from the root *trai*, and it denotes protection and shelter for cows i.e., cow-shed. Later; it was used for denoting sub-divisions among the Brāhmaṇa caste, and this tradition continues even to this day.

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monkey), *gagraya* (bull, earthworm-related), *gaviṣṭira* (cow-born), *kareṇupāla* (keeper of cow or elephants).

The *Purāṇas* advocate the unity of all sentient and the non-sentient beings. The *Viṣnu purāṇa* informs us that gods, men, animals, reptiles and birds are but various forms of *Brahmā* as they emerged from his limbs. It also gives details regarding the origin of animals, their primordial place and leadership in the creation process.

The doctrine of *karma or karmavāda* and the theory of trans-migration (*punarjanma*) emphasize that a man traverses through a series of births, both in human and animal forms, depending on his merits or demerits. This thought-process percolated into the *Jātaka* and *Avadāna* tales of the Buddhist tradition. Thus, *Bodhisatva* assumed the lives of very many animals before culminating in the Buddhahood. He was born as a monkey eighteen times, a lion ten times, an elephant six times, an eagle five times, hare and deer a dozen times, and a horse four times.

Buddhism and Jainism emphasize the doctrine of non-violence (*ahimsā*), and their followers extended extraordinary care and protection for all the animals, constructing several sanctuaries and forests such as *nāgavana* (serpents and elephants sanctuary), *mṛgavana* (deer) and *pakṣivana* (birds). The authors of epics and several noted literati have in their important works, left behind significant accounts of various animals, sometimes in a poetic imagery, but in the socio-religious contexts of their times. In course of time, attempts were also made to classify the living beings based on their habit and habitat in a broad way, as evidenced by some texts.

The importance of some major animals was such that specific treatises were written on them like *Pālakāpya*, *Aśvaśāstra* (science of horses), *Gajaśāstra* (science of elephants), *Sarpaśāstra* (Herpetology), *Gārudi Vidyā, Khagendramaṇidarpaṇa* (Toxicology). *Pālakāpya* and *Aśvaśāstra* were a great source of inspiration for several poets.

Birds in the Hindu tradition served not only as symbols of good and evil aspects, but also were part of some animistic beliefs besides signifying the highest state to be attained by a devout Hindu. Snakes entered the life of man and Indian literature in various ways. Serpent myths and cults associated with these myths came to the fore, raising serpent to a divine status.

Indian coinage, art, architecture and sculpture have preserved the rather mysterious relationship of animals with man and gods, metaphysical concepts, and became symbolic in nature. It also gave expressions to the myths, legends, imaginations, hallucinations, hopes and fears of a multitude of people. These also provided an inspiration for the literati to design articulate several animate and inanimate characters that embellished a vast body of Sanskrit literature.

During the Moghul period, Jehangir was the greatest naturalist among Moghuls, who contributed significantly to the development of Indian zoological sciences.

Thus Hindus lived, then as now, in harmony with animals both wild and domesticated. They believed in the philosophy of '***eco-friendly co-existence***'—an attitude which has been continuing undisturbed even with the passage of time and the changing phenomena of Indian ethos. In this chapter, an attempt has been made to present a perspective on this enchanting attitude.

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Early man

Primitive man was greatly influenced by his environment, as his all-round development depended on the ecological and geographical factors and he came into close contact with nature with all its diversity. There was the struggle for existence between him and the other animals and, in fact, it was a question of survival for him. Hence, he designed some tools and discovered fire. Pre-historic man such as the Peking, Java ape, Heidelberg, Piltdown and Neanderthal slowly learnt the art of manufacturing crude stone implements like hand-axe, burin and others. In the Paleolithic (3,00,000 years ago) and later the Mesolithic age, hunting was the chief means of survival for him. He lived in caves, made crude stone tools, and fashioned clothing for himself from the skins of animals. A keen observer as he was, he even painted human and animal forms on the walls of caves.

In the Neolithic age (from about 8,000 B.C.), when man, the food-gatherer, began to lead a settled life, he devised bow and arrows, thus his hunting became easier. He introduced other stone implements like small knives made out of bone, and even produced threads by weaving the wool. He constructed wooden platforms on the banks of the lakes and rivers to save himself from the attack of enemies, ravages of nature and wild animals. While his ancestors were thriving on animal flesh, wild fruits and vegetables, the neolithic man started agriculture, subsequently domesticating the animals like dogs, cow, sheep, ass, pig, camel and fowls.

But still, the savage nature of the animals surprised and shocked the pre-historic man. He suffered from conservatism, egoism and fear[1]. Fear of the deadly consequences made him to be conservative: He was afraid of the natural happenings such as thunderstorm, lightning, floods, earthquakes, diseases, and so on. He believed that the deadly animals and these natural catastrophes had super-natural powers. He branded them as spirits, both good and bad. At the same time, he also super-imposed all the human qualities on the animals. Several beliefs and myths were invented by him to show the extraordinary nature and strength of the animals. He invented several rituals, as well as cults in order to save himself from such natural calamities and the deadly attack of animals.

The ancient tribal people believed that death was only an assumption of another form, and that the souls of the dead would assume the form of animals. They felt that these souls should be honoured out of respect or fear. Thus, harmony and friendship was sought to be established between primitive men and some species of animals, resulting in the birth of totemism. It was believed that animals had super-natural powers, and were capable of understanding the divine language, could assume any form they like and live for a long time. Hence, several myths, beliefs, cults, rituals were coiled around animals, especially deadly animals. Thus, animalism, totemism, fetishism, sympathetic and homeopathic magic, and taboos were invented by tribal people. These were practised extensively for the realization of some specific desires, and such practices varied to some extent from tribes to tribes.

Totemistic myths : Totem is a symbol. It may be an animal, a plant or an inanimate object traditionally and religiously connected with a social group or community of people,

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who adopt that totem as their symbol, and the group also derives the name of that totem. That social group establishes a magical and religious relationship with that symbol, and presumes that it descended from that animal or plant, and refrains from eating that totem, except under special circumstances. Myths are also created around that totem, and worshipped with religious fervour and sanctity for self-protection. The totems are generally a class of inanimate objects.

Totems are of 3 kinds: (a) *clan totem*, which is common to the whole clan or dynasty, inherited from generation to generation; (b) *sex totem*, common either to all males or to all females; (c) *individual totem*, belonging to a single individual exclusively.

Fetishistic myths : The word *fetishism* is derived from the Portuguese word, fetisho-archarm, i.e., something in the nature of an art form applied to any object and regarded as possessing consciousness, volition, magical power, etc. "The fetish may be a bone, a stone, a bundle of feathers, a fossil, a necklace of shells in which the wandering spirits lie". For example, the red stripes or lines painted on walls, rocks in the villages and some forms near ponds or lakes, representing Mother goddess may also represent fetishism. Barbaric people all over the world believe that the object of fetish is inhabited by spirit.

Metamorphic myths : Metamorphosis means a period of rapid transformation from larval to adult form. It often involves considerable destruction of larval tissues. Our ancestors might have observed the life-cycle of frog, butterfly, etc., with curiosity from close quarters, and believed that such transformations were possible within themselves through the practice of magic. For example, the Nagas believed that sorcerers assumed the forms of tigers for killing people. A number of myths originated from such ancient beliefs in which there was a free transformation from human form to that of animal form, and *vice versa*.

But even as the environmental knowledge and worldly wisdom of early man increased, all the same he did not set aside the taboos and magic. Instead, he invented several rituals to satisfy his so-called spiritual ego. Towards this end, several types of sacrifices were invented by him. A host of specialized people like the wizards, witches, charlatans, sorcerers, and magico-religious healers emerged on the scene. It was believed that these type of people were capable of speaking to the gods and supernatural powers directly, and were capable of curing deadly diseases. Perhaps from such practices, various forms of worship might have begun.

Early man, being an agriculturist basically, believed that the life of a corn existed in the shape of an animal. He assumed that the animal corn-spirit could assume several forms such as cow, horse and goat. He also believed that the corn-spirit was found in the harvest field, in the barn, and on the thrashing floor. Hence, some forms of animals were made out of cake and eaten ritualistically. The practice of eating the corn-spirit denoted the eating of the sacred animal itself. In the early Greek culture, corn-spirit itself was considered as an animal. For instance, *demure* was considered as a horse. Frazer opines that some animals driven at the time of reaping might have prompted the ancestors to assume corn-spirits[2]. Some scholars are of the view that our ancestors conceived the idea that the life of corn was preserved in an animal which served as a tutelar deity.

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As noted before, pre-historic people decorated the ornaments, pottery, and even clothing with some animal forms. This artistic representation had magical and religious significance. It stood for a motif of a totem, an emblem or a kind of animal worship. The various colours of animals, too, had their own significance. For instance, white colour stood for light and purity, black for darkness, evil and death, green for prosperity, etc.

Animal cult and worship : Primitive people all over the world worshipped animals, and this form of idolatry was one of the oldest forms and revealed the weakness of human nature[3]. They worshipped all sorts of animals hoping for good or expecting danger from them. Traditional Hindus offered worship to animals, then as now, based on the relative advantages or disadvantages of animals. Idolatry arose as a result of self -interest and fear.

Classification of cults : Animal cults were classified depending either on their outward or inward forms and characters. Sometimes, a single animal was venerated for the purpose of worship. Some sacred animals were also sacrificed annually in some rituals. The pastoral tribes honoured the species on which they fully depended for their livelihood. Hence, such animals were domesticated, and the cult worship also began with respect to those animals. Researchers classify animal cults under several broad heads as follows[4] : (i) pastoral cults; (ii) hunting cults; (iii) those of dangerous and noxious animals; (iv) those of animals conceived as human souls; (v) totemistic; (vi) those of secret or esoteric societies; (vii) individual cults of tutelary animals; (viii) tree and vegetation cults; (ix) those of ominous animals; (x) those of animals associated with certain deities; and (xi) those of animals used in magic. Sometimes, the pastoral tribes honoured an animal, domesticated it, and spared the entire species from slaughtering it, for example, cow and cattle in the Hindu tradition.

Hunting cults: Among the hunting cults, the animal which has been recognized for honour is habitually killed as a repentance for the loss of individual members of the tribe. For example, bears, buffaloes and fish were killed by primitive people after hunting them. Deadly animals and nocturnal animals were worshipped because of fear all over the world. Hence, serpent worship came into vogue in ancient India. Even now, some tribes in Central India worship a stone, which is assumed as a lord of the tigers. They believe that it contains the spirit of the tiger[5].

Some animals were considered as totems by the primitive people. Insulting them or killing them was a taboo in those days. Sometimes, the entire species was considered as a totem, and sometimes the male or female of the species was considered. Thus, cattle in the Vedic period, snakes in the Purāṇic period, and *Garuḍa* in the epic times, served as totems in the Hindu mythology and tradition. The totemic animal was an integral part of every religious or ritualistic activity of a tribe. There were also androgynous forms. For instance, in the Hindu tradition, a *gandharva* or a *yakṣa* had the form of horse and man. Some aquatic goddesses had the forms of fish and woman.

Sometimes, the warbling of the birds signalled an omen for the householder. Such birds were branded as ominous ones, and several cults developed around them to drive

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away ominous effects. Specific birds were assigned to specific gods and goddesses. In the tāntric cults, several birds were used for magical purposes.

The animal worship might have arisen as a result of a blind faith in the existence of ancestors. Some animals not only figured in the myths and legends connected with the deluge, but also acted as messengers between the human and the divine. For example, fish played a great role in the flood legend of *Manu*. Sages of India believed that a thousand-headed *Śeṣa* (serpent) was holding the burden of the earth, and his sudden movement would result in earthquakes. In primitive cultures, the tribal people would drink the blood and ate the flesh of animals presuming that they would attain the qualities of those animals.

Animals served the basis for tales and fables, in which they behaved like human beings. Witches were associated with some animals, and they used them at the time of performing magico—religious rites. Primitive people prohibited the eating of the flesh of some animals for pregnant ladies. They were under the impression that the offspring would assume the characters of the animals thus eaten. Hence, various food taboos came into vogue[6]. The traditional belief was that the soul of man would assume the form of an animal, resulting in trans-migration. Hence, slaughtering of animals was banned sometimes[7].

Animals in the Pre-historic period : As noted before, pre-historic people of India represented various species of animals on the walls of the caves and sheltered rocks through ruddle or hematite drawings, through which perhaps they remembered or memorized the animals they hunted often. Such drawings are present in several hilly ranges, specially of central India, which include rhinoceros, stag, horse and deer[8].

Animals of Harappan and Mohenjo-Daro cultures: Extensive excavations of the sites of Indus Valley Civilization or Harappa culture, as the archaeologists prefer to call it, have brought to light the depiction of a wide range of animals on pottery, seals, figurines and toys. The list includes mammals, molluscs, amphibians, reptiles, fish and birds[9], which can be classified as domestic, semi-domestic and wild forms.

The domestic animals are the bovine species, horse, ass, goat, sheep, elephant, camel, dog, cat and other mammals. The remains of a fowl and black partridge have also been found. The animal remains of the jackal, wolf, mongoose, shrew and rat are found in some other historic sites. Perhaps, they were visiting the human settlements time and again.

Elephants, both semi-domesticated and wild, rhinoceros in their abundance, Indian bison or the gaur, several species of deer and tiger were the wild animals that existed in those periods. Although horse appears to have been known to Harappans and this has not been established beyond doubt, it was not so useful as an animal in the early period. Marine forms such as chank shell (*xancus*), arc shell (*Arca*), several species of tortoises and turtles, gangetic gharial, crocodile and monitor lizard remains are also found. Surprisingly, the remains of lion and cow are conspicuous by their absence[10].

Harappans were skilled in several types of crafts such as statuaries, terra-cotta, boat building, production of bricks, and the like. These skilled artisans engraved the animal

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Indian humped bull

Elephant

Unicorn

Tiger

Rhinoceros

1. Representation of animals on seals of Mohenjo-daro

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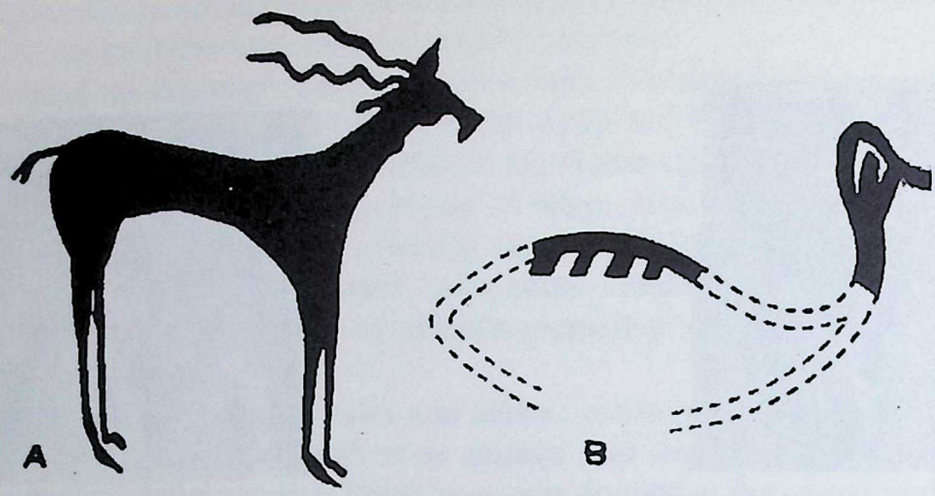

2. Animal paintings on pottery of Kalibangan, Rajasthan.

3. Animals in *Jātaka* sculptures (after Hora, 1955).

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4. Miniature of the dodo and a few other birds, painted during the reign of Emperor Jahangir.

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profiles on seals, potteries, animal figurines and toys. The animals represented on the seals are short-horned bull, humped bull, buffalo, elephant, Indian rhinoceros, tiger, gharial, antelope, frog, Indian gazelle and the goat[11]. Some animals in combination have been inscribed on seals and other artecrafts. They include ox-antelope, goat-antelope, and a fabulous animal with two heads[12]. Deer with its varieties and their remains have been found in the excavated sites of Harappa, Mohenjo Daro, Chanu Daro, Lothal, Kalibangan, and other places. Strangely, cow has not been represented on the seals at all. Animal paintings on the pottery of Kalibangan in Rajasthan show a blackbuck, duck, spider and a scorpion[13]. Other designs on Harappan and Mohenjo-Daro pottery include those of reptiles, birds such as ibex, pigeon, parakeet and peacock as well as mammals, viz., elephant, monkey, mongoose, goats, fishes and a fisherman with a net[14]. Several species of fish have also been represented on the pottery remains excavated from Nal in the Jhalawan division of Katat state, Baluchistan[15].

Short-horned bull has been represented on as many as 95 inscribed objects with its head lowered over a long, hollow vessel. Single-horned rhinoceros has been represented on the copper tablets at Mohenjo-Daro. The hind and the fore legs of that animal which have several dots are found on 36 seals. Buffalo on fourteen seals; gharial with dark brown colour and circular forms imprinted on its back, on fourteen seals; tiger in its different aspects on fourteen seals at Mohenjo-Daro; and humped bull with a trough on the objects at Mohenjo-Daro, Harappa and Kalibangan, are other animal forms.

A large number of seals (about 1160) from Harappa and Mohenjo-Daro contain a mythical animal which is called unicorn depicted mostly as a one-horned, fabulous animal with stripes on the neck, saddle-like markings on the body. Some scholars have identified it as either *Bos primigenius* or *Bos namadicus.*[16]. Further, the combination of human figure with hoofs, horns, and the tail, Ram-bull-man-elephant and tiger jumbled together, heads and necks of six animals radiating from a common ring are depicted on some other seals[17]. Perhaps, the combinations represent totemistic beliefs of early human cultures[18]. The depiction of variegated fauna on the seals, pottery denote that these settlements were on the banks of huge rivers, and contained vast tract of jungles or forests.

Animals In The Ṛgveda

The Vedic and the post-vedic people were keenly interested in the animal world. They viewed the animals from the cosmic and temporal planes, trying to classify them based on their habit and habitat in a broad way. All their observations have been recorded in the Vedic and the post-vedic literature as indicated in the following table.

Macdonell and Keith have given us a list of over 260 animal names used in the entire Vedic literature[19]. As the vedic people were primarily agriculturists, cows and oxen have been mentioned in the literature more than 400 times.

Cow: The animals of *Ṛgveda* can be broadly classified as domestic, semi-domestic and wild. Among the domestic ones, cow occupies a pride of place. There are several hymns

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describing the species or varieties of the cow, their habitat and behaviour, in addition to prayers to the cow. Cows having same form (*sarūpa*), different colours (*virūpa*), same colour (*ekarūpa*)[20], of various hues (*pṛṣṇāya*)[21], a robust cow, udder full of milk (*goduhe sududhāmiva*)[22], cow's milk-giving capacity (*vandyāsah gavahana*) *śvetari dhenu and* milch cow[23] (*vāsari dhenu*) have been mentioned in various Ṛgvedic hymns.

Herds of cow leaving the cow-shed at dawn and returning at dusk was a common sight in the Vedic period. There were multitudes of cow sheds[24] (*gomātah vrajan, rasayaḥ ustrā iva, gotra*). Hundreds of cows (*śatagavi gavāṃ yūtha*) were making noises like a river (*vāsraha payasā dhenava iva*)[25], and continuously billowed and attracted the calves[26](*gavahana raṇyanti*). The billowing cow was called a *vasra*[27]. They used to freely enter the sacrificial hall[28], and their food was *yava* grass[29].

The *Ṛgvedins* considered cow as the personification of motherhood, fertility and liberty. The cow gave them milk, butter and ghee. Dried cow-dung was used as a natural fuel. They used to mix the *soma* juice (symbol of male principle) with milk, and drink it during rituals. Cow was also compared to the goddesses *Pṛuṣni, Aditi,* and *Uṣas and* streams of milk, to rays of light. Rain was regarded as none other than the milk pouring from the udder of cows.

Bull: Compared to the cow, the references to bull and oxen are relatively smaller in number. Bulls have been classified based on their nature and behavior. A massive bull having great strength (*ukṣaṇah vṛṣabhāsah, bhīmaṃ gāṃ na, dadharaḥa gauriva*)[30], bull with a sharp horn (*tigmaśṛnga vṛśabhah*)[31], a bull bearing the burden[32] (*vāhah*), a youthful and an intoxicated bull (*pramuṣka bhārah*)[33], a bull with a steady gait (*vamsanga, kakudma*)[34], a vagabond and a forest bull[35] (*vaṃśagoṇa*), a bull surging forward like a river and running like a horse (*vamsa-ghana*)[36], bull which is crimson red in color (*sonaha vrsa*) billowing and entering the herd in search of a male[37], have been referred to in the *Ṛgveda.*

Horse: Another domestic animal known to the *Vedic* people was the horse. The seers describe the horses drawing the chariot of gods and the goddess through the air. Seven horses were yoked to the chariot of Sun-god. Horses of various kinds and colours have been described in the *Ṛgveda* along with several breeds of horses. The best type of horses was called *svāsvāha*[38], and they included *hari*, and *indrahari* (probably, the horses of *Indra*)[39], *niyuta* , *pṛṣati*[40], and a special type of horse capable of charging quickly called *rohita*[41]. An young stallion was called *vṛṣāśva*[42], and the stallions and mares were naturally fast in their movements[43] capable of taking the owner to the destination[44]. The fleeting horses were always surging forward, and appeared like a flying arrow[45] or a swift wind moved in the right path[46]. A well-trained horse was called *Ayava*[47]; and horse with a gentle gait was known as *Āryavāji*[48]. Horses were attractive, as they had long hairs on their necks[49].

A mare was called *aśvavadh*, and a fertile mare was called *vṛṣanvatī*. A maiden was compared to a mare[50] (*aśva na citra*), and was called *rohitāśva*. The herd of mares appeared like *pṛṣada* cows. The stallions were used in warfare. The *Vedic* people proclaimed that they were desirous of facing the enemies with the help of horses. By

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winning the war, the kings and warriors were assured of food and, in the moments of crisis, they used to kill the horses and eat their flesh[51] (*saptim uājam bharaṃ*). The Vedic supremo, *Indra,* was endowed with the best of powerful stallions[52]. Hence, *Indra* was praised with the epithets *Arvasa* and *Aśvapati*. *Uṣas*, the goddess of dawn, was compared to a charming mare[53].

Vedic people offered prayers to their anthropomorphic gods to bestow on them herds of healthy horses and implored them to cure a diseased horse[54]. The mechanism of reproduction is mentioned in a hymn, in which there is a reference to a pair of colts born out of a single mare[55]. Horses, besides being used for chariot races and warfare, were sacrificed at the time of what is called the *aśvamedha yāga*. One of the earliest references to the *aśvamedha* sacrifice can be seen in the *Rāmāyaṇa*, where *Daśaratha* is described as performing it. Interestingly, *Kausalyā*, one of the wives of *Daśaratha*, is said to have killed the horse in three strokes[56]. Horseflesh was freely consumed and cooked in pots or pits.

Other Animals: The domesticated animals, apart from cow, bull, horse and oxen, included donkey, ram, goat, monkey, dog, elephant, camel and buffalo. The wild animals comprised lion, wild boar, forest wolf, deer and its varieties, mongoose, crocodile, rabbit and Indian guar. The Vedic people were familiar with aquatic animals like crocodile, frog, and aquatic birds such as swan, ruddy goose. Birds of prey like hawk, vulture, owl, fish and common forms of birds like pigeon, sparrow, peacock, peahen, and crow have been alluded to in the Vedic literature, besides reptiles such as snakes, both poisonous and non-poisonous, and rodents and insects like wasp, moth, mosquito and ant.

The stag and deer, although they are wild in nature, had been domesticated owing to their familiarity in penance groves.

Birds: Birds were called *patatrī* (winged), *khaga, śakunta, śakuna, suparṇa, vaya, viva, eṇi, ve, vya, mārtāṇu*. Among the birds of prey, falcon or hawk is mentioned umpteen times. The falcon always rested in the nest. Maruts are compared to a wandering hawk. They had broad wings (*suparṇa*), and soar up in the sky after suddenly attacking the small birds. The mystic mantra *gāyatrī* and its presiding deity was called *Śyena*. The falcon used to fly along with the seven steeds and Sūrya.

The vulture or *gṛdhra* and *Garuḍa*[57] appear in several hymns. Common aquatic birds such as swan and curlew, goose, blue coloured goose called *nīla pṛṣta*, water fowls, ruddy goose or *cakravāka*[58], water fowl (*ataya*)[59], pea hen (*mayuryaha*),[60] pigeon (*kapota*), a swift-moving dove by name *Patiṣta*[61], sparrow called *vartika*[62], owl[63] (*ulūka, khargava*) common crow (*kṛṣṇa śākuna*)[64] and special birds, such as *cāṣa, hāridrava*[65], deadly noisy birds *kikīdivi*[66] were recognized by Vedic people.

Insects such as fly (*makṣīkā*)[67], moth (*patangara*)[68], mosquito (*vara*)[69], spider (*ūrṇanābha*)[70] and bee (*makṣa*)[71], a worm by name *upajīvikā* (a parasite)[72] are mentioned in several hymns.

Fish belonging to Phylum Pisces are recognized[73]. Surprisingly, the fish (*matsya*) was mentioned sparingly by them, although they lived on the banks of several rivers.

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A full hymn called *Maṇḍūka Sūkta*[74] describes the croaking of the frogs with the chanting of the priests, who have drunk *soma*. Further, the frogs are requested to bestow on wealth and longevity to the petitioner.

The Vedic people were fond of hunting, apart from cattle-breeding. They captured lions (*simha*), tigers, boars (*varāha*), and antelopes with the help of bows (*cāpa*) and arrows (*Iṣu, śara*). Dogs were employed for hunting and guarding the cattle. Buffalo, both wild and tamed, bear (*ṛkṣa*) and monkey, etc., are mentioned in the later hymns of the *Ṛgveda*.

Gods and Animals

Animals played a significant role in the Vedic mythology. Several animals were attributed to several gods as their vehicles. Thus, Indra had *airāvata* (elephant) and *uccaiśravas* horse. *Agni* had ram, *Yama* had a buffalo, a pigeon, an owl and a pair of dogs, *pūṣan* had goats as their vehicles. In the major Vedic rituals, horse was considered as a symbolic of *Sūrya* and *Agni*.

There was also a symbiotic deification of some animals. The first rays of dawn (*uṣas*) and the massive clouds were praised as cows. The rainy clouds, with their variegated colours, were imagined as cows with many hues. Cow itself was praised as mother Earth and goddess *aditi*, the mother of gods. Sometimes, *Indra* the god with a thunderbolt, appeared in the form of a massive bull and roared. The cow gained an important place in the Vedic and post-Vedic periods. In the words of Macdonell, "to no other animal has mankind owed so much, and the debt has been richly repaid in India with a veneration unknown in other lands. So important a factor has the cow proved in Indian life and thought, that an exhaustive account of her influence from the earliest times would form a noteworthy chapter in the history of civilization"[75].

Yama, the god of death, had a pair of dogs as his messengers, and the path leading to the hell was guarded by a pair of killer-dogs. *Saramā*, 'the divine bitch', acted as a messenger of gods[76]. *Agni* was described as an eagle (*Śyena*) flying in the firmament, which brought *soma* from the heaven to the Earth. Goat used to be sacrificed with horse, since it was believed that it acted as a messenger of the sacrificer to the gods, announcing the sacrificial offerings. The chariot of *Pūṣan* was drawn by a pair of goats.

Cow was an integral part of several Vedic rituals. A particular type of cow called *Vaśa* used to be sacrificed and offered as an oblation to gods[77]. A cow was also given as an offering to the priests, and hence it was called *dakṣinā*. Cow's milk was poured into a sacrificial fire at the time of marriage[78].

Several animals of the *Ṛgveda* found a place in the Vedic mythology, too. Western Indologists called the Ṛgvedic animals by a broad name, viz. animal deities. *Indra-Vṛtra* myth, of creation related cosmic waters which were compared to the cows.

Paṇis, the chief among the demons, have been described in several Rgvedic hymns as those, which blocked the Sun's rays, and created all obstacles at the time of rituals and sacrifices keeping the treasures for themselves. The Rgvedic priests would recite the

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magical hymns to force the *Paṇis* to release the treasures. Their chief was *Vala* with whom *Indra* fought—a symbolic representation of the triumph of good over evil.

The Ṛgvedic people regarded animals as an integral part of their agrarian and pastoral culture. Their predominant god Indra was a culture-hero, a solar and an agricultural god. He fulfilled the innate desire of a formidable leader, capable of blocking the onslaughts of *ahi* or *vṛtras,* the demonaic forces. During the Rgvedic times, various animal cults such as *theriolatry,* and *ophiolatry* had just started. The deification of animals showed the animistic beliefs of the Vedic people.

Table showing the animals known to Vedic people, and their references in the four Vedas.

Sl. No	Name of animal	Rgveda	Yajurveda	Atharvaveda
	I. WILD ANIMALS			
1.	Lion (*mṛga, simha, khādina*)	I.21.154.2/II.4.33.11/ III.1.2.11/ IV.2.16.14/ VI.2.16.4/ VIII.34.3/ IV.3.17 (there are more than 25 references in the Vedas)		
2.	Tiger (*vyāghra*)			
3.	Wolf (*vṛka, sālavṛka, kravyāda*)	X.6.73.3/X.7.875/ I.17.17, X.7.86.4/ I.18.126.6/ X.2.28.9/ IV.2.8.10.		
4.	Deer (*mṛga, kṛṣna*) and its varieties	X.7.94.5/VIII.4.10/ IX.5.96.6/ I.22.163.7/ III.4.451/ V.4.53.1		
	a) Nilgai (*mṛgāṇāṃ mahiṣah*)	I.17.116.18		
	b) Spotted deer (*pṛśatī, bhujya*)	V.4.53.1		
	c) Cinkara (*kilāsya*)	III.4.45.1		
	d) Gazelle (*hariṇa*)	I.17.116.18		
5.	Indian gaur (*gavaya*)	IV 2.21.8		
6.	Elephant	IX.2.33.1/ X.5.95.4		
7.	Brown Ape (*vṛṣākapi*)	X.7.86.3		
8.	Snake (*sarpa, sarīṣṛpa, tsaru damṣṭra, atti*)	I.24.189.5/VIII.350.1/ VIII.6.75.4/ IX.5.86.44 (more than 30 references)		XIII.687/ VI.3.1.11/ VI.56.1.8/ X.4.1.20
9.	Gangetic porpoise (*śiśumāra*)	X.12.166.5/ VII.6.103.1/ X.16.14		
10	Frog (*maṇḍūka*)	IV.2.19.9/ VII.103		

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II. DOMESTICATED ANIMALS

11	Cow (*go, ḍhenu, aghnyā, stari*)	I.2.6.5/II.2.16.8/ IV.4.3.5/ VII.6.99.3/ VIII.7.69.10/ X.9.106.10 (more than 80 references)	IV.23/ VIII.43 (more than 50 references)	III.28.1.6/ X.10.1-34/ XII.4.1-53/ XII.5.1-73
12	Bull and Oxen (*vṛṣabhāsaḥ, vamsagah, vadhrī, ukṣṇah*)	I.22.161.7/ II.19.1/ VI.2.16.39/ IV.5.57.4/ VIII.9.81.3/ V.4.56.3/ VII.5.794/ X.9.102.4		XIII.13/XVIII. 260.27/ XXXV.13 IX.7.1-26 XIX.25.1-3
13	Horse (*aśvaḥariḥ, niyuta*)	I.16.114.10/II.4.37.4/ IV.547.3/ VII.4.69/ IX.1.232/ X.6.75.7 (more than 60 references)		
14	Dog (*saramā, śvā, śuna*)	X.1.14.10/ X.14.11/ V.47.4		
15	He-goat (*chāga-aja*)	I.22.162.2-3/ X.2.26.6/ I.18.126.7		
16	Sheep (*meṣa*)	X.120.1/ VIII.8.74.13/I IX.5.86.17/ X.7.91.14/ VIII.1.5.37	IV.26/ XIII. 45/ XII.50/ XIII.14	II.29.1-8/ IV.14.1-91/ X.9.1-27
17	Buffalo (*mahiṣa*)	X.7.86.4/ II.4.42.1/ VII.355.2		
18	Camel (*uṣṭra*)	X.9.106.6/ I.13.84.17/ X.3.40.4/ IV.1.41		

III. BIRDS

19	Vulture (*garuḍa, śyena, garutmān*)	I.17.118.4/ II.4.39.1/ I.17.118.4/ I.22.164. 46/ X.1.149.3		
20	Swan and its species (*haṃsa*)	I.22.163.10/ II4.34.5/ X.2.32.3/ VII.4.59.7/ X.5.67.3/ III.1.8.9 (more than 20 references)		
21	Peacock and pea hen (*mayūra*)	I.24.191.14		
22	Pigeon (*kapota*)	X.12.165.		VI.27.1-3/ 28.1.3/ VII.64.1-2
23	Sparrow (*vartika*)	I.17.16.14.18/ X.3.39.13		
24	Owl (*ulūka, khargava*)	X.12.165.4/ VII.6.104.17		
25	Crow (*Kṛṣṇa Śakuna*)	X.116.6		

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	IV. INSECTS		
26	Fly (*makṣika*)	I.22.162.9/ I.17.119.9	II.31.1-52/ II.32.17/ VI.52.1/ V.23.1-13/ V.23.1.1-13
27	Moth (*pataṅga*)	V.4.40.2/ I.15.116.4	
28	Mosquito (*uara*)	II.1.4.4	
29	Spider (*ūrṇanābha*)	II.1.11.18	
30	Bee (*makṣa*)	VII.2.32.2	
31	Parasites (*upajīvaka*)	VIII.10.102.21	
32	Fishes (*matsya*)	X.5.68.8	
33	Tortoise (*kūrma, akūpāra*)		XIII.44/ XI. 46/ XI.15
34	Ass (*rāsabha*)		

Animals in the Yajurveda

The subject matter of the *Yajurveda* is the sacrifice. Any object involved in a sacrifice is given a divine status. Animals are also referred to in *Yajurveda* as objects in any precious sacrifice, and were believed to be representatives of the devotees for approaching the celestial, terrestrial gods beforehand and speak on behalf of the sacrifices. Hence, in the Yajurveda, there are a number of sacrificial formulae which are prayers to chosen animals[79]. Certain animals are assigned a divine origin also. For example, a horse is described as the child of rivers(*Nadīnām sīśuḥu*), while a bull is regarded as the child of *surabhī*, a mythical cow. The *Yajurvedic* priests have shown their highest regard to animals.

A few important animals mentioned in the *Yajurveda* are the goat(*aja*), horse(*aśva*), ewe(*avi*), cow(*go*), tortoise(*kūrma*), and female frog(*maṇḍūkī*). Among these, the horse and the cow are predominantly referred to in *Yajurveda*.

Animal deity: Horse is an animal deity (*Paśudevatā*). More than 50 *Kaṇḍikas* praise the horse being employed in several sacrifices, especially *Aśvamedha* sacrifice. Horse is given as *Dakṣiṇā* to a priest in *Soma* and *Vājapeya* sacrifices. The horse is looked upon as identical with deities like *Prajāpati*, *Āditya*. Several myths are associated with the horses. It is told that the horse was born out of the waters when the churning of the milky ocean took place. Hence, it is called by the epithet *Apsīya*. As many as 121 parts of horse's body are described here. Parched grain(*lāja*) is its food. It is capable of locating its part in the sacrificial place where *Agnicayana* is to be constructed. It is considered as most sacred and described as having great speed. Horse is yoked to the chariot and distances are covered in a less time. There are many functions ascribed to the horse during sacrifices. For instance, a horse is requested to smell the share of *bṛhaspati*, which may be symbolic of cleansing the region and portions of food. It was believed that the horse would protect the sacrificer and his wife, and would cause progeny to them. Since horse has a divine origin,

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it bears a number of relations with various deities. It can be noted that horse is nearer to animal deities at the same time and to mortals on the earth. Divine parents are ascribed to the horse. River and ocean are the parents of the horse. Mythically, it is believed that horse was capable of flying[80] (*Aśvasit bṛhat vayah*).

Cow is referred to in 18 verses. Cow has been regarded as a female deity in singular or plural forms. It is never regarded as an anthropomorphic form. It remains as a rich source for oblations and sacrifices. Cow is identified with the female deities such as *Aditi, Candra, Iḍa, Sarasvatī, Vāsavī*. Certain qualities of the cow are described well in *Yajurveda* mantras. Because of her intelligence, patience and sacrificing nature, cow is adjudged as a sacrificial animal(*Yajnīya paśuḥ*). Like horse, the cow is also given as *dakṣIṇā* in *homa*. She is directly addressed as *dakṣiṇāsi*[81]. Cow is the very source of food and prosperity. She is called by the epithets such as *Chatriya, Revati,* as she is strong, resourceful, for oblations and inexhaustive source for food. However, *Yajurveda* considers cow as a frail animal, to be properly guarded, protected and utilized. The priests brought a ban then on killing of cow, hence the term *aghnyā* (not to be killed) (8-43). Cow is requested to be friendly with the sacrificer, and never take revenge against the sacrificer[82](*Mame āyuṣi pravosihi me aham tava*).

The cow is requested to smell the *droṇakalaśa* containing *soma* juice. Symbolically, it may represent a purification rite. It may denote a fertility rite also, as *soma* is considered as a male principle where as the cow is the female. It was believed that the cow was capable of granting a heroic son to its worshipper(*Vīraṃ vindeyaṃ*).

A cow acts as a messenger to the sacrificer in the presence of Gods[83]. It has good relation with several vedic deities such as *Agni, Bṛhaspati, Mitra, Pūṣan, Rudra* and *Soma*. There are references wherein *Rudra* has shown courtesy (*Dākṣīṇya*) to the cow as he is benefited by it. A cow goes to *Soma* for the sake of *Indra*, and returns to the sacrificer as his friend. Cow was used as barter and *dakṣiṇā* in the times of the *Yajurveda*. In fact, cow was the monetary standard in ancient India, especially in the *Yajurveda* period.

Goat(*aja*) is mentioned in about 5 mantras. The goat's body is referred to be very fragile, but very significant[84]. Goat is described as *Prajāpati* himself. The goat is the best animal(*Paramapaśu*). Sometimes, it will be given as *dakṣiṇā* in place of cow. Several prayers addressed to the goat requesting to help the sacrificer(*Yajamāna*) for progress in the other worlds. A goat is requested to safeguard the sacrificial material and precincts of the altar in general. The goat is identified with the famous seer *Angiraḥ*. It was produced by *Agni* out of heat(*śoka*)[85]. Goat was the animal, which saw the creator first. Both gods and men regarded goat as their representative for making recommendations with respect to favour and prosperity.

Ewe or the female goat(*Avi*) is praised in two mantras. The commentator *Mahīdhara* informs that *avi* was born out of the *rajoguṇa* of *Prajāpati*, and it was the primordial creation of *Tvaṣṭṛ*. Ewe was regarded as the skin of bipeds and quadrupeds (*carmāmbara*). She is clothed in wool, and hence she is called *ūrṇāyu*[86]. This animal is very important as it protects the creatures of *Tvaṣṭṛ* by her skin. The animal is described as the navel of *varuṇa*(*varuṇasya nābhi*) because of her precious value[87].

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Tortoise is also mentioned in Yajurveda in a couple of mantras. It is a semi-divine animal, and is described as the lord of waters (*apām pati*)[88]. It has the strength of a bull and that of bricks probably because of its adamant shell (*vṛṣabha uṣṭakānām*). According to the *Yajurvedin*, it surveys the bricks employed in *Agnicayana* sacrifice. Symbolically, it guards the bricks piled up on the sacrificial altar. *Agni*, *Vaiśvānara* and *Sūrya* are kind to the tortoise as it helps indirectly in the sacrifices. Mythologically, divine rain(*divya vṛṣṭi*) brings forth the tortoises from the skies. Prayers are addressed to a tortoise wherein it could lead people to the world of manes or ancestors.

Only one *mantra* is devoted for the female frog (*Maṇḍūki*) in the context of *agnicayana* sacrifice. In one of the rituals, the frog is tied to a bamboo stick and it is waved over the fire altar to dispense with any evil omens. The female frog is chosen, because the bamboo stick *avaka* is feminine in gender. A female frog is called upon to visit the sacrificial altar and render it pure[89]. This symbolically represents the purifying quality of frog in waters. A *mantra* is chanted, at the time of waving .

The ass (*rāsabha*) is referred to in four *mantras*. The hind part of the ass is described as wide and comfortable for seating purposes. An ass is steady and has firm limbs (*vidvāṅgah*). It is described as a strong, hefty animal, running with full speed (*vājin*). It brays and rolls on the ashes[90]. The donkey as a deity provides prosperity for the people and for the sacrificer(*asmāyuḥ*). A donkey blesses the sacrificer with freedom from fear (*abhayāni kṛṇvan*). It is told that the donkey with the god *Pūṣan* sped through the firmament[91]. By this, we can infer that the donkey is related to the sun. It should carry the mud on its back for sacrificial purposes, and hence the epithet *Agnipurīṣavahin*.

Further, serpents are described in only two *mantras*. Trees, caves, low-lying areas and waters were considered to be their dwelling places. They were used as arrows by black magicians (*Yātudhānas*), who created untold miseries to the people in those times[92].

Compared to the *Ṛgveda*, references and descriptions to the bull are very less in *Yajurveda*. It is called as *vṛṣabha* and *Anadva*. The term is attributed to *Indra* and *Agni* also(*Vṛṣabhoagnihi*, *Indrāgni*). He is the son of *Surabhi*[93]. It has to carry the heavy loaded carts. The sacrificer desires for a hundreds of bulls[94]. The status of a bull is elevated to that of *Indra*[95].

Six mantras refer to *Paśu* as a deity in general. The internal and external organs of a *Paśu* are described in great detail. A *mantra* says that as the sacrificer cleanses the limbs of the animal one by one, his prosperity would get enhanced[95]. A *Paśu* was described as the oblation of the gods (*Devahavi*). The wooden pin and knife (*svaru* and *sasa*) are defined in a *mantra*, and are requested to protect the *paśu* being annointed with the clarified butter[97]. In one of the myths, it is described that the gods such as *Agni*, *Vāyu*, *Sūrya* were originally *paśus*, but attained the divine status and better worlds by their performances[98].

Insects which preoccupied the sacrificial place were symbolically removed by waving the sacred *darbha* grass. The *Yajurveda* makes references to biting insects, stings (*dantaśūka* and *daṃṣṭras*), which are detrimental to a sacrificer. Prayers are addressed to the gods for driving these stinging bees from the sacrificial hall.

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During major sacrifices, several species of animals are brought to the spacious sacrificial hall, tied to sacrificial posts on the day of the sacrifice. Specific mantras are chanted for each animal, and finally they are set free.

Animals in Atharva Veda

Atharva veda gives a series of charms to overcome the attack of worms, snakes and evil birds, especially a black bird. The sages recognized several types of deadly worms. They are *kururu*, *algandu*, *calūna*, *avaskara*, *vyadhvara*, the worms which are four eyed, variegated and wheatish in color, king of the worms, worms with a pair of horns etc[99].

Some worms and pests caused diseases to the cattle. Hence, *Āditya* or *Sūrya* is solicited to kill these mountain pests, which come in the form of waves[100]. The worms (*kṛmis*) trouble the head, ribs of man and with the incantation of *Agastya mantra*, the people were desirous of crushing those worms. Scorpions (having two horns and a receptacle of poison) were dreaded most by *Atharvans*. The worms entered the eyes, nostrils, teeth of men. They had brown ears, white arms, and sometimes had three heads[101].

The *Atharvan* sages were afraid of tiger, wolf, thieves and snakes. They request *Indra* to crush those four enemies. They want to crush all the twenty nails (*nakha*) of the deadly tiger. The anthropomorphic god is called the tiger crusher[102](*jambhana*).

They recognized several types of snakes. They were *kairata*(barbaric), *upatṛṇya*(grass dweller), *talmata* (brown serpent), *aligi* and *viligi*, *urugāla*, prickly porcupine, *sakta*, broad-knobbed[103], crosslined, blacksnake, adder(*prdaku*), *carkota*, *nīcina*[104], *kṛṣṇanīla*, *paidva*(wheatish), *rathravi*, *daconasi*, *kankanaka*, *taudi* etc..[105] The *Atharvan* chaplain gives hymns against the snake poison and haemo-toxic and the neuro-toxic effects of snake poison and method to overcome that poison. He solicits *Indra* and *Āditya* to kill these nocturnal creatures.

The Atharvans were afraid of black dove, hawk and a black-winged creature, *kapota*. Their visit to the houses was considered as a bad omen and signaled death. Hence, they request *Yama*, the god of death, not to send those winged birds to their homes. Four hymns connected with the evil of black birds are described in the text[106].

Several hymns extolling a cow, an ox, and a horse are described in the text. It was believed that a cow giving birth to a calf out of season would destroy the cattle, and the cow would turn into a flesh eater. Hence, they pray to the cow to give birth to the calf in a proper season[107]. The sages extolled the cow because of its extraordinary nature and behaviour. The cow was considered as the very embodiment of gods, of *Soma*, and they believed that gods such as *Agni*, *Parjanya*, *Āditya*, *Indra*, *Maruts*, *Varuṇa*, *Vasu* and others stayed in her body. They proclaim thus: "On the cow, the gods subsist, on the cow, even also, the cow became this all; so far as the sun looks abroad[108] ".

Even ox is praised thus. Further *Revati* star is his neck, *Kṛttikās* are his shoulders and is the progenitor of all the cattle[109]. A horse is praised, and the priest says that he is desirous of riding the horse and desirous of moving in the mountains, in the valley and return to the abode safely[110].

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The *Atharvan* priest slaughtered a white sheep, goat and cow in some sacrifices[111]. Sheep was sacrificed at the time of ceremonies.

Fauna in the Nirukta

Yāskācārya gives a list of animals in his classic work, the *Nirukta*. He describes the etymology of these words based on the nature, behaviour and habitats of birds and other animals. The wild animals treated by him are wolf (*vṛka*), lion (*siṃha*), tiger (*vyāghra*), wild boar (*varāha*), elephant (*Ibha*), deer (*mṛga*) and monkey (*lāṅgala*).The semi domesticated is the mouse (*mūṣikā*). The domesticated animals such as sheep (*varaṇa*) cow (*dhenu, go, adhanyā, usra*), horse (*aśva, dadhikta*), goat (*meṣa*), dog (*śvāna*) are mentioned. Among reptiles, snake (*ahi*) is mentioned. The aquatic animals are frog (*maṇḍūka*), tortoise (*kacca, kaccada, nāḍīkaccha*), fish (*matsya*) and insects such as worms (*kṛmi*), an ant (*pipīlikā*), a variety of ant (*upajihvikā*—that which smells), caterpillar (*kapana*), gad fly (*daṃśa*) find a place in his text[112].

Etymology of some of the animal words is interesting. They are as follows: *Śvāpada*—*śuna iva padam yasya* i.e., who has the gait like that of a dog.

Vṛka is derived from the root *Krnt.vi+krnt*, that which bites. *Lāngala* is derived from *lag|langh* as the tail has been attached to an animal as well, and it also hangs down.

Vyāghra is derived as *vi+a+ghṛ*, that which smells.

Varāha. vrhati milani vṛhah+mul, one who removes the roots.

Kṛkavāku—kṛka is an onomatopoeic word, and denotes imitation of hoarse or wrought iron.

Dhenu—Dhenvrdhayathene , that which sucks.

Paśu—is traced to *drś,* to see.

Siṃha(simhah sahanatn himserva syāt) sam+ha+han.

Śyena—(Śamsanīyaṃ gacchati) Śamsa+Ve that which moves admirably.

Śvāna —(Gati karmaṇaḥ śvasiterva) śu+ya to go quickly.

Aśva—(Aśvaḥ kasmadasnutedvanaṃ mahāśanobhavati). aś, that which occupies the road, one who eats a great deal.

Go—(yat dūraṃ gatā bhavati, yath ca asyam bhūtāni gacchanti) Gamer Ga to go.

Animals in the Epics

The familiar animals of the *Rāmāyaṇa* are lion[113] (*kesari, siṃha*), tiger[114] (*vyāghra, śārdūla*), wild boar[115] (*varāha*), elephant[116] (*gaja, nāga, mātaṅgakunjara*), monkey (*plavaga, golāngūla, vānara*)[117], deer (*mṛga, eṇa*)[118], horse[119](*aśva, haya, vāji*), bull (*vṛṣabha*), bear (*rūkṣa*)[120], cow[121] (*dhenu, go*). Among the reptiles, snake (*nāga, vyāla, sarpa, sarīsṛpa, ahi, pannaga*)[122], and the domesticated animals included buffalo[123] (*mahiṣa*), *meṣa* (ram), *aja* (goat), camel (*uṣṭraga*) and donkey (*khara*)[124].

Insects such as cicade[125] (*Jhillikā*), scorpion (*vṛścikā*), mosquito (*maksa*), gad fly (*damśa*), bee (*kīṭa*)[126], aquatic animals (*jalacāriṇa*), such as fish (*matsya*), turtle (*kacchapa*), gangetic porpoise (*śiśumāra*), crocodile (*nakra*), watersnake (*bhyaṅga*)[127].

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The *Rāmāyaṇa* makes a classification of horses and elephants, according to the regions to which they belonged.

There were horses in Ayodhya belonging to Kāmboja, Bāhlīka, forest regions and river beds. There were elephants from Vindhya mountain and then Himalayan mountain regions.

Besides, the epic has interesting details about several types of birds, fish, poisonous snakes and the like. All the animals referred to in the *Vedas* and the *Rāmāyaṇa* are found in the *Mahābhārata* also. In addition, this epic deals with several myths associated with snakes. The *Āstikaparva* of *Mahābhārata* gives a list of 170 names of snakes, which were sacrificed at the *Sarpayajña*, the chief priest being *Janamejaya*. It is important to note that Kautilya stressed the need for the preservation of the live-stock. He suggests in his *Arthaśāstra* that there should be separate departments for cows, horses and elephants (*godhyakṣa*, *aś vādhyakṣa* and *hastyādhyakṣa*) under the supervision of a chief person for each department. He recommends that there should be a separate sanctuary for wild elephants called *nāgavana*.

Fauna in the Works of Bhāsa and Kālidāsa

Although generally the names of all the animals mentioned in the earlier works are found in the works of *Bhāsa* and *Kālidāsa,* they contain some new nomenclature. A cow elephant is called *hastinī*, a bull elephant, a *gasarva*, and a tusker, a *madagaja* or *nāgendra*. There are references in these works to the capture of lions and their slaughter at the time of some sacrifices[128], besides the capture of elephants by charms, and also by playing on the lute. Of special mention is the squint-eyed brown ape, *kekarapingaḷa* and rhinoceros (*khaḍgamṛga*). The nature of bees is explained in *Svapnavāsavadattaṃ* in an elegant manner. Moths were used to extinguish lamps during late night.

A cow with a slit-nose,(*chinna nāsikadhenu*) and a tawny-coloured cow have also been mentioned. The casting off their skin by snakes has been described by *Bhāsa*.

Among the birds, female osprey(*Kurarī*)[129],*Cakora* and *Maina* (*Bhūtikasārika*) are worthy of attention. *Bhāsa* has also mentioned that there were forests full of wild elephants and deer.

Kāḷidāsa has described a kind of ox (*gavaya*)[130], Himalayan and Tibetan musk deer[131](*mṛganābhi*), a massive animal of great strength called *śarabha*[132], *kāmarūpa* horses[133], mule(*vami*)[134], white ants or termites (*valmi*)[135], *Indragopa* insect, which is red in color and appearing in the rainy season in a swarm[136], aquatic animals like hippopotamus[137], sharks[138], special types of fish (*rohita and śaphari)*[139].

Among the birds mentioned by Kāḷidāsa are the one called *cātaka*, a special kind of bird (*cuculus melanoleucus)*, which drinks only water from the rain clouds[140], and *kraunca* and *kanka*[141], a type of heron or water fowls with long legs and neck. It would appear that parrots were taught to imitate human voice and speech.

Bāṇabhaṭṭa, a stalwart of Sanskrit prose romance, has in his masterpiece *Kādambari,* gives a glimpse into the rich and diversified fauna of India in his times.

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Classification of animals

Matsyapurāṇa classifies animals and birds as:

a) *divācaraḥ*—those moving during day time, such as *kapiñjala, tittira, kapota* etc.
b) *rātrigocaraḥ*—those found during night, such as owl, *śarabha, krauna* etc.
c) *ubhayacāriṇaḥ*—those found during day as well as night, such as *haṇsa, mṛga, mārjāra* (162-55-57).

Viṣṇupurāṇa mentions *grāmyapaśus* and *araṇyapuśus,* animals living in towns and animals living in forests. *Araṇyapaśus* are further divided into seven categories (1-5-51,52).

In Amarakośa

The *Amarakośa* or *Nāmaliṅganuśāsana* is a great lexicographic work of Amarasimha (4th century A.D.). It has 3 *kāṇḍas* or sections, and each of them is sub-divided into *vargas* or classes.

The *simhādivarga* of the II canto of this lexicon deals with the names of animals in 44 verses. The animals have been categorized according to their habitats and habits, under the following heads:

(i) Mammals (class mammalia)	:	525-535 verses
(ii) Gnawing mammals or rodents	:	536-537 verses
(iii) Arthropoda—Insecta	:	538-539 verses
(iv) Aves (Birds)	:	540-561 verses

Verse no 564 gives a list of synonyms for "pairs" and for "off springs". Verses 565-69 gives synonyms for 'groups'. As many as 22 words denote collections, such as flock, herd and crowd. The author gives a list of carnivorous and herbivorous animals, and brand them as *paśus.*

The wild fauna, which have terrestrial adaptation and listed here, are: lion (*Panthera leo*), tiger (*Panthera tigris*), rhinoceros (*R.unicornis*), Indian gaur or bison (*Bos gaurus*), boar (fossorial adaptation), yak, bear, jackal (*canis avreus*), hyena (*Hyaena striata*), porcupine (*Hystrix*), and others. The rodents or gnawing mammals are: rat, mouse, bandicoot, orpigrat (*Mus giantess*, which exhibit fossorial or burrowing adaptation) lizard, Indian monitor lizard (*varanus*), and chameleon are the reptiles. The herbivorous mammals mentioned are hare, rabbit (*Gryctolagus cuniculus*), deer and its varieties. A mythical animal mightier and powerful than the lion viz. *śarabha*, and an animal appearing like a cow viz. *Gavaya* (Nilgai), are also mentioned.

A list of worms and insects are given in verses 552-555. Any insect or worm covered with bristles or stings is called *vṛścikā* or *śūkakīta*. It also means a silver fish (*Lepismna*), found among old, tattered and neglected books. A worm belonging to phylum *nemathelmynthes* is called *Nilangu*, Lac insect *Kṛmi* or *Krumi*, scorpion (*Palamnaes*

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swamaherhame), spider, white ant, cockroach (*Periplaneta americana*), housefly, honey bee (*Apis*), gad fly, wasp (*Polistes*), cricket or cicada, grasshopper or locust (*Locusta migratoria*), firefly, blackbee, crab (*Limulus*), gnat, mosquito (*Anopheles culex*), earthworm, leech (*Hirudiaria granulosa*), horse leech belonging to phylum annelida are enlisted here.

Amarasiṃha gives in his erudite work as many as 26 synonyms for birds having volant (aerial) adaptation[142]. The varieties of birds (class *Aves*) listed by him are pigeon (*columba livia*), falcon, owl (*Biabobuba*), sky-lark, wag-tail, vulture, blue jay (*Coracias bengalensis*), the fork-tailed shrike, playing in water (*lanius coerulescens*), wood pecker (*Dryobates*), *cātaka* bird (*Cuculus melanocucus*), fowl, jungle fowl (*Gallus*), Indian cuckoo (*Cuculus indicus*), crow (*Corvus splendens*), raven, water fowl or the gallinule, wild turkey, Bengal kite, vulture, parrot, heron or curlew, crane (*Ardea nivea*) Indian crane (*Cyrus*), ruddy goose or the *Brāhmiṇi* duck (*Anas casarca*), jeal or drake, osprey, swan, gannet (a kind of goose with brown legs and bill), flamingo (*phenicopterus*), tordus ginginianas(*śarāre*), bat, cormorant, cooṭ (*Fulica atrica*), *Hārīta* (a kind of a green pigeon according to some, or a kind of parrot feeding on the leaves of black pepper), partridge (*Francolins partridge*), wild cock, quail (*Coturnix*), cireck partridge(*genus tetroperdix*), lapwing (*Lobiavanellus indicus*), *ṭiṭṭibha*, peacock (both tamed and wild), talking mina(*Garula religiosa*), purple moorhen(*Kadamba*), and *Garuda* (*Elanuscaeruleus*). Frog (belonging to class Amphibia, *Rana hexadactyla*) and pearl oyster (Phylum mollusca) have also been mentioned.

Pātālabhogi varga of Section I gives a list of aquatic animals. 30 synonyms are given for the word serpent or snake. *Vasuki* is considered as the leader of serpents (I.9-250). *Śeṣa* or *Ananta* is considered as the leader of *Nāgas* or serpents (class reptilia) with human faces inhabiting the nether world. Other snakes such as Indian python (*Python molurus*), boa constrictor, Fresh water snake (*Natrix piscator*), sea snake (*Hydrophis, Enhydrina*), sand boa (*Emphisboena*), have been mentioned. An aestevated snake is called *nirmukta* and *muktakancuka*. Nine types of poisons or venom's viz. *Kakkola, Kālakūta, Hālāhala, Saurāṣṭrika, Śauklikeya, Brahmaputra, pradīpana, Dārada, Vatsanābha* perhaps, based on the snakes geographical habitats, have also been listed.

The Vā*rivarga* of Section I deals with some aquatic animals such as fishes, mammals, reptiles, worms etc. The reptiles are Tortoise (*Trionix gangeteaes*), crocodile (*Crocodilus porosus*), gharial (*Gavialis gangeticus*), Iguana and a fabulous marine monster, i.e. *Makara*. It gives a list of various species of fish (superclass pisces) such as *rohita* (*labeo fimbriatus*), *sakula* (*Channa striatus*), fish living among reeds Garramullya (*cakratuṇḍa*), flying fish (*Cypsilurns*), sheat fish (*wallago attu*), shark, porpoise, gangetic porpoise, etc. Hippopotamus (fresh water adaptation), otter, whale and an insectivorous mammal, namely shrew(*sorex*) also find a place here. *Kṣatriyavarga* of third section gives a list of elephants, parts of elephant's body (verse 802-09), horses and their species, (811-816). The *Vaiśya varga* provides a list of bulls, bullocks, types of cows, yoking, types of calves, etc. (V 945-960). The *Śūdravarga* of second section gives a list of hunting equipments and synonyms for dogs and mastiffs (cyon). The spotless white horse of *Indra* is called *uccaiṣravas* (I. 1.53), whereas the white elephant of *Indra* is called by various names such as *Aiāvata, Abhramātaṅga, Irāvaṇa, Abhramuvallabha*. The domesticated animals identified

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by the author are bull (*zebu*), Indian humped bull, bullocks, ox (*gavaya?*), cow, horse (*Equus cabalus*), goat (*capra hircus aegragus*), donkey (*Equus hemionus*), sheep, dog (*Canis familiaris*), hound, cat (*Felis domesticus*), camel (*Camelus dromedarius*) and pig.

Some highlights

Amarasiṃha has given the names of deer (artiodactyla) that gives the best type of hide (*Kadale, Kandale, cina*, i.e. *chinkara* or spotted deer), *camūru* (this deer uses the tail hair as a royal husk). He has mentioned various species of deer. For e.g, *Gandharva* is a musk deer (*Moschus moschiferus*), black buck or doe (*priyaka*), black antelope (*kṛśnasāra*), spotted deer (*ruru*), fast-moving deer (*vātaprami*), hangul or Kashmir stag, blue bull (*rauhiṣ gokarṇa*) chital (*Axis axis*), barasingha (*Cervulus muntjac*), hog deer, *Chinkara* (Indian gazelle or *Gazella gazella bennetti*), and red deer (*Ana, Ṛṣya, Rohita*), are also mentioned in this work. The artiodactyls have cursorial adaptation.

As the elephants and horses were used in Indian warfare, a detailed description of these two mammals are given in *Kṣatriya varga*. An elephant in rut is called *madotkaṭa, mattakāla*. Young elephant is called *kalabha* and *kariśāvaka*.

A furious elephant is called *prabhinna, garjita* and *matta*. A horse of a good breed is called *ajaneya*. Different breeds are mentioned such as *vanayu*, Persian horse (*pārasīka*), *Kambhoja*, Balkh or Tartar horse (*Bāhlika*), *yayu* (a horse fit for the *Aśvamedha* sacrifice), fleet as well as horse (*javana*), pack horse (*pṛstya, sthavrin*), (is it a mule?), white horse, draught horse (*krka*), mare (*vamī, aśvā, vadavā*).

A large bull (*vṛṣa, mahokṣa*), old bullock (*vṛddhokṣa, jaradgava*), a young ox, *damya, vatsatara,* a calf intended to be reared as a sacred bull (*arśabha*), a bull without horns (*kucara*), are listed in the *Vaiśya Varga* (II.9)

As the cow played a crucial and divine role in the socio-religious domestic lives of people, then as now, cows based on their habit and nature have been classified in the *Vaiśya varga* as follows: cows in their successive ages are called as *dvihāyani, dvivarṣa, ekābda, ekahāyani* and the like. A miscarrying cow is called *sravadgarbha* (*avatoka*), barren cow (*vaśā, vandhyā*), a cow which has mated with a bull (*sandhini*), a cow with a still born calf (*vehat, garbhodghātinī*), a pregnant cow for the first time (*bālagarbhiṇī*), a gentle cow (*sukara*), a fruitful cow (*bahusūti or pareṣṭuka*), one that has calves at long intervals (*cirasūta or baskāyani*), that which has just calved (*dhenu, navasūtikā*), that gives milk easily (*suvrata or sukhasandohya*), one with large udders (*pīnodhnī, rivara statre*), and that which calves every year (*samamsamora*). The author mentions that Otter or cidra (*tutra*) is semi aquatic creature living in rivers and lakes. It has short dense fur on the body and webbed digits in both the limbs. It has a flat tail and small pinnae. It devours fish and frogs.

Some of the words referred to animals are onomatopoeic ones derived from the actions or the sound produced by the animals; for example, a wasp or a housefly is called *varvaṇa* as it makes a continuous *var var* sound. *Amarasimha* has provided also the synonyms for some animals based on their instinctual habits and nature. A lion is called *pañcāsya*. That does not, however, mean that it has five faces. According to the

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commentary of *Kṣīraswamin*, *pañca* means expanded (root-*pacci vistāre*), a lion has a very broad face and it can also open its mouth in a broad way, and hence the name. A boar is called *stabdharoma*, as its erect hairs horrifies the enemies; a monkey is called *valīmukha*, as it has a wrinkled face; a bison is *vāhadviṣa*, as it is the enemy of the horses; a porcupine is *śvāvit*, as it pierces dogs. As the bee moves very quickly, it is called *bhṛṅga (bhṛṣena gacchati iti bhṛṅgah)*. Although Amarasimha has not made any definite zoological classification, they represent several phyla from the modern stand point, and reveals the poet's keen power of observation with respect to nature, his attempt to classify in a novel way.

Animal classification in Caraka and Suśruta saṃhitās

Caraka in his *saṃhitā* has given an account of four primary divisions of animals: *Jarāyuja* (born from the uterus i.e. viviparous, for example, mammals and primates), *Aṇḍaja* (born from the ovum or egg, i.e. fish, reptiles and birds); *svedaja* or *ūsmaja* (born of moisture and heat, asexually generated creatures such as worms and insects) and *udbhijja* (born of vegetable organisms)[143], whereas *Praśastapāda* the exponent of *Vaiśeṣika* system adds two more divisions: *Ayonija* (animals that are asexually generated); and *yonija* (sexually generated i.e. from the union of sperm and ovum). He further divides *yonija* into *jarāyuja* (placental mammals such as man, cow, buffalo, goat and sheep), and *anḍaja* which include fish, reptiles and certain birds. According to *Udayana*, an exponent of the *Nyāya* system, *jarāyu* means a placenta[144]. *Suśruta* has categorized animals into *samsvedaja* (born out of heat and moisture), and the other three types as mentioned by *Caraka*.

Śankarācārya, in his commentary on *Chāndogya Upaniṣad*, says that *udbhijja* animals arise from vegetable organisms.

The *saṃhitās*, *Gajāyurveda* (Āyurveda of elephants) and *Aśvāyurveda* (Āyurveda of horses) provide details regarding the anatomy and physiology of some animals, including elephants and horses. Another text, *Garbhopaniṣad*, has dealt with the descriptions in the development of human foetus and embryo.

Fauna in Varāhamihira's Bṛhatsaṃhitā

The *Bṛhatsaṃhitā* (6th century A.D.) contains vital information on animals under various heads, such as the features of cows, dogs, roosters, tortoises, goats, horses and elephants, and describes the lives of birds and beasts, and the behaviour of wild animals. It has also some details regarding evil omens associated with some beasts and birds[145].

In addition to the classification of animals on the basis of their modes of reproduction, *Caraka* and *Suśruta* have classified animals based on their food habits and habitats. *Caraka's* classification is as follows:

1. ***Prasaha***: Animals and birds, which eat by snatching away the food: cow mule, ass, camel, horse, monkey, panther, lion, bear, wolf, tiger, hyena, etc.

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2. ***Bhūmiśaya***: Animals, which live in burrows, in caves: python, hedge hog, shrew, pangolin, frog, gecko, marmot, mongoose.
3. ***Anūpa***: Those which live in marshy lands: elephant, buffalo, antelope, wildboar, rhinoceros, hog, bear, etc.
4. ***Vāriśaya***: Animals living in water (aquatic): tortoise, crab, fish, estuarine, crocodile, whale, pearl oyster, conch snail, crocodile, gigantic dolphin, great Indian crocodile, etc.
5. ***Vāricara* or *jalacara***: Birds moving in water: swan, crane, pelican, etc.
6. ***Jāṅgala***: Animals living in dry land forests: Spotted deer, Kashmir deer, musk deer, hog deer, hare, red deer, etc.
7. ***Viṣkira***: Gallinacious birds: quail, gray partridge, red jungle forest.
8. ***Pratuda***: Packer birds, which peck food, eg.: Woodpecker, kingfisher, house sparrow.

Śusruta has made two broad divisions viz., *jāngala* and *anūpa,* with further 13 sub-divisions. They are: *jānghāla, viṣkira, pratūda, guhāśaya, prasaha, parnamṛga, vileśaya* and *grāmya* among the first broad division, and *kulecara, palav, kośastha, pādina* and *matsya* among the second broad division.

The *paṛnamṛgas*, which live on trees have arboreal adaptation of life. They are apes, monkeys, squirrels, some species of reptiles and carnivores. The *grāmyas* living in villages, consist of horse, mule, ass, camel and other domesticated animals. Subterranean animals living in holes and burrows are called *vileśaya*, which comprise rodents, insect and reptiles.

Among the *anūpa* group, *kulecara* are of elephant, rhinoceros, buffalo, and different species of deer. The *plavas* are aquatic birds like crane, swan, pelican, etc. Among the *matsyas*, one can find *time, timingala īmakara. Kośasthas* live in shells such as molluscs. *Pādina* have pedal or fin-like appendages, and comprise turtles, tortoise, crocodile, black crab, gangetic porpoise, dolphin etc.

Umāsvāti, a Jaina scholar, provides a different system of classification, based on the sense organs and the reproductive nature of animals, as follows:

A. *Animals possessing the senses of touch and taste;* (i) *Apādika:* worms without appendages; (ii) *Gaṇḍūpāda*: knotty-legged animals belonging to phylum arthropoda; (iii) *Jalūka:* leeches; (iv) *Nūpūraka*: ring-like animals with pendants, Annelida; and (v) Some types of molluscs, conch shell, pearl oyster, snails

B. *Animals possessing the senses of touch, taste and smell:*

(i) *Kāṣṭha hāraka*: destroyers of wood e.g. Termites; (ii) *pipīlikā*: ants;

(iii) *rohiṇika:* red ants; (iv) *sātapadī, utpataka*: centipede and spring-tail;

(v) *traṇapatra*: plant lice; (vi) *trapuṣabīja* and *kārapā sāsthikā:* cucumber, cotton; and (vii) *upacika Kunthu, tuburuka:* bugs and flees.

C. *Animals possessing the senses of touch, taste, smell and sight:*

(i) *bhramara, uarata, Sāranga* eg. bees, wasps, hornets; (ii) *kīṭa-patanga*: flying & non-flying birds; (iii) *damṣa makṣikā, puttikā:* All types of ants, files & mosquitoes; and (iv) *vṛścika, nandyāvasta:* scorpions, spiders.

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D. *Animals possessing all five senses:*

(i) *bhujanga*: reptiles having limbs and a few amphibians; (ii) *catuṣpāda:* mammals; (iii) *matsya*: fishes; (iv) *pakṣi*: birds; and (v) *uraga*: limbless reptiles e.g. Snakes

In the last category, Umāsvāti further makes a sub-division into *aṇḍaja, jarāyuja* and *potaja* types. *Aṇḍajas* are oviparous animals comprising fishes, and reptiles. *Jarāyujas* are of all placental mammals, having non-designate or non-delicate placenta, like man, domesticated animals, yak, hog, *gavaya* and wild beasts. *Potaja* are those mammals which have delicate placenta, like porcupine, elephant, hedgehog, hare, squirrel, mongoose, etc.

The foregoing classification of animals was largely based on the general behaviour, habit and habitat of those animals in India. Yet, this was a significant contribution in the realm of zoological studies compared to their Western contemporaries.

The anatomy and physiology of animals were observed by our ancients during the treatment of human beings in a broad way. The *Gajāyurveda* and *Aśvāyurveda* deal with the anatomy and physiology of elephants and horses, respectively. *Yajurveda* describes 121 parts of a horse. The *Saṃhitās* of Caraka and Suśruta describe the metabolic, circulatory and nervous systems of human beings. However, these scattered and descriptive references hardly throw any light on the specific knowledge of anatomy and physiology of animals from modern zoological point of view.

Animals in the fable tradition

An interesting dimension of animals relates to their characteristics, and the nature of which have been represented in several popular tales and fables written by Sanskrit scholars over the centuries. The origin of what may be called the beast fables can even be traced to the Vedic literature. In these fables, some animals have been represented as speaking and behaving like human beings, bringing home vividly a tenet, a satire or a moral. Thus, we find *satyakāmajābāla* in a fable receiving instructions from a bull, a flamingo and an aquatic bird in the Upaniṣadic passages. In one of the passages of the *Chāndogya Upaniṣad*, a group of dogs recite the sacred hymns like priests and howl for food. Although there are scattered references, in the earlier literature to such presentations, they laid a solid foundation for enchanting fables in the epics and other later literary works. For example, the story of a pigeon that honoured a greedy hunter offering its flesh to him is found in the *Rāmāyaṇa*[146]. The story of a bird giving the equivalent of golden eggs in the *Mahābhārata* is too well-known. Around the third century B.C., the Buddhist tradition encouraged the beast fables and several collections, such as *jātaka* and *avadāna*, nurtured the tradition of beast fables. Such tales provided a fillip to the *Pañcatantra* of *Viṣṇu śarma*, the famous book of fables.

Since the fables such as these were connected with *nīti* or moral wisdom, they became didactic in nature. It is interesting to note that while the story was generally narrated in prose, the moral was given in verse, and the appropriate verses were chosen from sacred treatises, epics, polity and other books of authority. Several fables were interwoven to engender a motif of moral wisdom.

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Hence, the *pancatantraṁ* and *hitopadeśa of Nārāyaṇa Paṇḍita* became extremely popular beast fables. The former has structured several beast stories under the broad canvas of a main story dealing with the king Amaraśakti of Mahiḷāropya and his dull and unimaginative sons.

In these fables, a wide variety of animals as lion, jackal, rabbit, bull, cow, elephant, monkey, donkey, snake, tortoise and turtles, crocodiles, fish, frogs, birds such as crane, swan, *ṭIṭṭibha*, sparrow, crow, pigeon and owl, insects like bedbug, wasp, bee and mosquito dominate the scene and behave exactly like human beings. In fact, the author has super-imposed the good and the bad, the noble and the ignoble characters of human beings on these animals, while weaving the story and propounding a moral. It is impossible to depict here the whole range and the ever-lasting treasury of fables. But a few examples will suffice to provide an insight into them. There is a story in which a lion (*Pingaḷaka),* gentle in nature, but is motivated by a pair of jackals *Karaṭaka* and *Damanaka* to kill a sheltered animal[147]. Another lion (*Bhāsuraka)*, which is hasty and has no sense of discretion, is driven to death by a clever rabbit.[148] A noble lion *Madoṭkata* is forced to slay its camel friend *Kranthanaka*, which was carried away by the wicked words of its friends, an elephant, a crow and a jackal[149]. The caucus of animals devices a plan to kill the camel, and they interpret the rules to suit their nefarious designs. The innocent lion has jackals as its friends which are cunning in nature as we see in several stories[150].

Jackals (*śṛgāla*) have been depicted as corrupt, cunning, greedy and cheating by nature. For instance, we come across a jackal by name *Candarava*, being attacked by a pack of killer dogs. It tries to deceive them, but in the process courts its own death[151].A greedy jackal which, with a lot of food before him, did not want to let go the blood in the bow string left by a dead hunter, nibbled it and got transfixed and died[152]. Another jackal *Pralobhaka* drives an intoxicated bull *Tīkśṇaviśāna* to death [153]. Once or twice, a jackal is also represented as being noble in the story of *Devaśarmā*[154].

Rabbits, although small in strength and stature, are depicted as shrewd, clever, and they become successful in warding off the calamity and various difficulties. The stories of *Lambakarṇa* and *śīghraga* illustrate this aspect[155]. An elephant named *Caturdanta* obeys the words of the rabbit *Lambakarṇa*. Surprisingly, donkey (*rāsabha*) is painted as a cunning and an arrogant animal, but dies as it fails to know its strength and weakness in a couple of stories[156].

A chatter-box tortoise, namely *kambugrīva*, although curious in nature unfortunately dies as it fails to follow the instructions of a pair of swans[157]. Monkeys have been presented as being apprehensive, revengeful, hasty, and also intelligent in several sub–stories[158]. In a story, a female sparrow insults a monkey resulting in the former's death. A male crocodile eats a humble pie by heeding to the advice of its adamant and arrogant mate and thereby loses its intimate friend *Raktamukha*, a monkey[159]. The lesson, that unity is strength, is taught by the story of a flock of pigeons caught in a hunter's net. Their leader *Citragrīva* suggests that instead of struggling among themselves, they should strive hard to fly up together with the net. They are later saved by their friendly mouse *Hiraṇyaka*[160]. The motif, that the genus feeling is all-powerful, is seen in the story of a mice being nurtured by a mendicant. The mice is transformed into a charming girl, but she accepts a mouse as her companion ultimately[161].

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The author of *pañcatantram* depicts the character of snakes as cunning, hasty and greedy in all the subfables. For example, a black serpent called *Mandaviṣa* cleverly devours the frogs, having convinced their dull-witted king[162]. *Atidarpa,* an arrogant serpent, is killed by an army of powerless but united ants[163].

A variety of birds occupy a predominant place in a story which basically deals with the enmity between crows and owls. Among the birds, crane is symbolic of cheating[164]. We find in another story that a male *ṭiṭṭibha* bird, haughty in nature, does not heed to the advice of its mate and thereby loses its eggs[165]. A formidable enemy such as an elephant is killed by a pair of tiny sparrows as the former destroys the eggs of the latter. The sparrow couple seeks the help of a wasp, frog and a bird to kill a rogue elephant[166]. A god-fearing and holy-natured sparrow, *kapiñjala,* advocates the path of righteousness[167].

The *Rāmāyaṇa's* account of a sacrificing pigeon is repeated in the *Pañcatantraṃ*[168]. There is another story to convey the message that a crow is symbolic of observation, caution and sometimes cheating. The crow named *Laghupatanaka* warns a flock of pigeons in one of the stories, while *Meghavarṇa*, another crow behaves like a scoundrel[169]. Owls are depicted as being clever and revengeful. The general dictum that the cheats join hands to obtain a petty benefit or to annihilate an enemy is brought about by the story of *Agnimukha*, a bed-bug[170]. Another story in the *Pañcatantram* tells us that snake and mongoose, dog and cat, lion and elephant are arch rivals and each take an opportunity to kill the other, either alone or unitedly.

The names christened by *Viṣṇuśarmā* for many animals are quite interesting, as they are based either on their external forms or internal nature or instinctual habits. For instance, *pingaḷaka* (tawny-coloured), *agnimukha* (fiery mouth), *kāṣṭakūṭa* (intensity of roughness), *kravaymukha* (flesh-faced), *sūcīmukha* (needle-faced), *hiraṇyaka* (golden-coloured), *tīkṣṇaviṣāṇa* (sharp-horned), *citranga* (variegated-limbs), *meghavarṇa* (cloudy-coloured), *caturdanta* (four-tusked), *laṃbakarṇa*(long-eared), *raktamukha* and *karālamukha*(red-and deadly-faced), denote the external forms of animals.

Names such as *caṇḍarava* (terrible voiced), *vīṇārava* (sound of the lute), *meghanāda* (rumbling of a cloud), *vajradamṣṭra* (sharp teeth), *caturaka* (clever), *mantharaka* (slow moving), *pralobhaka* (enticing), *sīghraga* (speedy), *arimardana* (crusher of enemy), *atidarpa* (extremely arrogant) and *mandaviṣa* (slow poison) signify the nature and characteristics of the various animals appearing in the fables. More than 25 stories of the *Pancatañtram* are repeated in the *Hitopadeśa*, which are too well-known to be recounted here.

Thus, the animals were employed as characters in the fables for emphasizing *nīti* or worldly wisdom, and those fables became narrative and instructive in character.

The contribution of *Mānasollāsa* to the knowledge of animals is inestimable. An extensive survey of variety of animals and birds is made in the Book IV of the work. Various factors such as age, emotions and features are taken into account for the classification of animals.

Hindu gods and animals

As noted before, animals played a significant role in the mythological and religious activities of Hindus since the Ṛgvedic times, and horse was predominant among them, as

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it was believed to draw the chariots of gods and was also used as a sacrificial animal (*Aśvamedha* sacrifice). In the post-Vedic period, horse was symbolic of sexual power. The mythical beings, the *Gandharvas* and *Kinnaras* had horse faces and were called as *Aśvamukhas* and according to an account, they used to abduct sturdy-men to gratify their sexual desires.

Basava Purāṇa informs us that *Nārada*, the divine sage appealed to Lord *Śiva* that *Śaivism* was in its dying stage and requested him to salvage it . *Śiva* commanded his lieutenant *Nandī* to manifest himself as a leading preacher, and thus *Basavaṇṇa* was born to herald *Vīraśaivism*[171]. In the Vedic sacrifices, horse was symbolic of Sun and the Fire. For the Vedic people, horse was the emblem of war, and it was identified with the rain god[172].

Vedic people being agriculturists gave an extraordinary and divine status to the cow and the bull. Cow was considered as the mother of *Maruts* or the Storm Gods. The sky was symbolic of the bull, whereas the Earth was imagined as a cow. It was believed that the cow was an abode for thirty-three crore gods, and a devout Hindu should worship the cow with utmost devotion and respect. Even the urine and cow-dung were considered sacred. Hence, cow slaughter was banned in the later Vedic period. In fact, *śatapatha Brāhmaṇa* stresses on the evil consequences of eating beef. Mahātmā Gandhiji was of the opinion that cow protection in India was an index of supreme faith. It denoted a wonderful phenomenon in the evolution of the human mind[173]. The bull was symbolic of the virility of men. The bull was called *Vṛṣabha*, derived from the root *Vṛṣ*, to rain or pour forth. Semen was called *Vṛṣṇyam payas*[174].

Gods in the animal form

A multitude of gods and goddesses assumed the form of various animals for the sake of human welfare. They annihiliated the demons, and protected the divine law and order of the triple worlds. *Viṣṇu* assumed the form of a horse, entered the ocean and killed the demons, *Madhu* and *Kaiṭabha,* leaving behind his horse's head in the ocean after accomplishing his objective. He was later called by the epithets such as *hayavadana or hayagrīva*(horse-faced or horse-necked)[175]. In one of the myths, it is narrated that he assumed the form of a horse for saving the Vedas, too[176]. Goddess *Kālī* assumes various animal forms to prevent her arch rival *Mahiṣa* demon attacking her. But even *Mahiṣa* changes into a buffalo, lion or elephant, and tries to coax her, only to be killed by her utlimately.

Even the demons have also assumed the form of animals to fight with gods. For example, *Dundubhi*—ox, *Dhenuka*—a donkey, *Mārīca*—a golden deer, *Mūkāsura*—wild boar, *Vatsāsura*—the wild cat, *Aghāsura*—a serpent, *Māṣa*—a vagabond bull, *Gajāsura*—an elephant, etc.

Aśvaghoṣa, the Buddhist literati, tells that queen *Māyādevī*, wife of King *Śuddhodana,* dreamt that a white elephant *airāvata* entered her womb, when she conceived and later *Siddhārtha* was born. Such metamorphoses or hagiography is a common feature in a plethora of Indian myths. The unitary philosophy of "one becoming many" or *ekajivāvāda*

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was the motivation for conferring the status of gods and goddesses on some animals, since the ultimate reality manifested itself in different animal forms, too. According to *Bṛhadāraṇyaka Upaniṣad*, *Vīrocana* was tired of his solitary life and desired to multiply. He himself split into two individuals, one acting as a male and the other as female. After some years, these two individuals assumed different animal forms such as ants, cow, goat, donkey and the like.

Lord *Viṣṇu* assumed several animal forms. Each animal manifestation symbolizes some creative aspect. *Matsyāvatāra* or the manifestation of fish symbolizes the power of fertility, and *Kūrmāvatāra* (manifestation of tortoise) is associated with the great flood. The gigantic body of the tortoise, its hard, disc-like shell, slow and steady movement, and its nature of withdrawing the limbs were related to the Sun. In one of the passages of the *Śatapatha Brāhmaṇa*, the tortoise is also identified with the life-span of the universe[176]. According to B.C. Sinha, the identification of the tortoise with Viṣṇu might have taken place in the Gupta period[177]. The *Varāhāvatāra* of Viṣṇu again corroborates the myth of the great deluge, and the boar symbolized the formidable strength of human beings. Since *Agni* and *Sūrya* are called by the epithets of *varāha,* the origin of the *varāha* worship can be traced to the *Ṛgvedic* times. *Narasimhāvatāra* represents the combination of ferocious lion and man to kill the demon called Hiraṇyakaśīpu. *Harivamśa* gives a detailed account of *Varāha* and *Kūrmāvatāras*[178]. These *avatāras* of *Viṣṇu* broadly denote perhaps a kind of organic evolution. In any case, their worship was widespread during the Gupta period, and later as evidenced by the sculptures dedicated to Lord Viṣṇu during this period.

Symbolism

The epics and *purāṇas* are a store-house of various symbolic myths, connected with gods and animals. This can be illustrated by two popular episodes.

First, the story of *Kāliyamardana*, associated with the exploits of *Kṛṣṇa*, is a symbolic myth revolving around the diametrically-opposite ideas namely death and immortality. *Kāliya*, a dark and deadly serpent is residing in the abyss of a river called *Kālindī*, another name for *Yamunā*, the daughter of *Yama*, the god of death. *Kṛṣṇa*, a symbol of the divine and immortality, climbs a tree called *kadamba* associated with immortality. He jumps into the *kālindī* river, destroys its destructive potential in the name of *kāliya*, and thus tames death leading to eternality represented by the union of the tail and head of the serpent after subduing its annihilating nature.

The second is well-illustrated by what is popularly called *gajendramokṣa* (emancipation of a tusker from the jaws of death). This myth, which appears in *Mahābhārata*, symbolizes the punishment to a very strong but arrogant huge animal *Gajendra* or the king elephant. *Gajendra* went to a lake to quench its thirst. It was seized by a crocodile (a cursed *Gandharva*). All its might was not of any help in its extrication from the jaws of death represented by a crocodile. It prayed with great devotion to Lord Viṣṇu, who with his *Sudarśana cakra* killed the crocodile.

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Vehicles of gods and goddesses

It has been a common phenomenon right from the classical period to the present day to witness the vehicles of many a god and goddess either in the sanctum sanctorum of a temple or processional deity. The term *vāhana* does not occur in the *Ṛgveda* in the sense of a vehicle. In the *Brāhmaṇas*, however, the word denoted a beast or a cart[179]. D.D. Kosambi is of the view that the idea of a vehicle of gods might have come from Mesopotamia to India through the traders[180]. It would appear that the vehicle also represented the energy and character of that god. As Heinrich Zimmer rightly points out, some of these animal vehicles also represented the idea of fertility, riches, prosperity on the earth. In other words, each vehicle stood for a symbol and a character[181].

The Vedic god, Indra, had *airāvata* or white elephant. The divine trinity, too, had their vehicles: Brahmā—a thousand swans, Viṣṇu had an eagle (*garuḍa*), and the great serpent *Ananta*, *Śiva* an old bull. Their consorts *Sarasvati*, *Lakṣmi* and *Pārvatī* had swan, elephant and lion as their vehicles, respectively. One also notices sometimes Goddess *Durgā* with snake around her breasts and standing on the head of a dead buffalo, or she is seated on the back of a lion or a tiger. Likewise, Kāḷī rides on a bull and has serpents as her bracelets with elephants as her eardrops. Śiva's two sons also are no exception. *Ganeśa* rides on a mouse and has a serpent around his belly; *Skanda* is represented with peacock and a snake. *Manmatha* or lord cupid has a crocodile. The *Navagrahas* or nine planets have also individual vehicles. Sun—seven horses; Moon—horses or white elephant; Mars—ram; Saturn—crow or Eagle; *Ketu*—vulture or pigeon; Venus—white horse; Mercury—lion; *Rāhu*—black lion; Jupiter—Yellow horse or fish; and *Budha*—four lions. Perhaps the white elephant was a symbol of royalty and fertility as it pours water on the head of goddess Lakṣmī. Crocodile represented fertility, and bulls were symbols of divine justice, while a white bull represented purity. Snakes were symbolic of darkness, revenge, evil and death. As the snakes shed their skin periodically, they were considered as emblems of immortality, too.

The gods and goddesses have adorned the hide or mounted that vehicle as a trophy for having killed the related animals. For example, Śiva wears the elephant hide dripping with drops of blood for having killed the demon *Gajāsura*[182].

Mythologically, there was a class of tribes called *Nāgas* and *Garuḍas*, which were arch rivals and engaged in warfare all the time. Viṣṇu arranged for reconciliation between the two tribes and, as a token of harmony, accepted the totem of both the tribes. Hence, he sleeps on the snake *Śesa* and rides on *Garuḍa*. Sometimes, in the myths of Indra, his elephant (*airāvata*) fights with the bull of *Śiva* and loses the battle. As an act of compensation, *Śiva* donates him the bull and assures *Indra* that he would get an elephant at the time of the churning of the milky ocean[183]. Śiva, known for his androgynous character (*ardhanārīśvara*), extends this concept to his family by cutting the head of a young boy (*Gaṇeśa*) and fixing the head with that of an elephant. He becomes *Gajānana*. According to several myths, *Viṣṇu* and *Śiva* sects were also at variance with each other. A synthesis was achieved between the two sects as we see from a reference to it in the *Skānda purāṇa*. "Gods saw *Siva* riding a bull on one side and a fish on the other. When they saw him in this form, they realized that *Śiva* and *Viṣṇu* were one[184].

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It is surprising to note that animals, which are arch rivals, lived harmoniously in the presence of gods and goddesses. For example, Gaṇeśa has rat and snake, *Kārtikeya*—peacock and snake, Viṣṇu—snake and *Garuḍa*, Śiva-Pārvatī have bull and lion. They signify the motif of diametrical opposition and the concept of thesis, antithesis and synthesis. The gods and demons who assume the forms of animals such as lion, tiger, horse, ass, bull, snakes etc., suggest various cults such as ophiolatry, ornitholatry, theriolatry, which was probably existing during the purāṇic times. It is also possible that several heroes destroyed the deadly old cults and ushered in new ones like *Kṛṣṇa's* killing of *Kālīya* serpent.

Śiva was hailed as the leader of animals and known as *paśupati* (lord of animals), or *Mṛgapati*. They believed that the macrocosm of *Rudra* resulted in the creation of variegated fauna[185].

Śankarācārya's stotras

In the eulogies (*stotras*) attributed to *Ādi Śankarācārya*, gods and goddesses have been praised with several distinct epithets, Śiva with a coil of serpents as his necklace (*Nāgendrahāra, śeṣavalaya, phaṇipativeṣṭita śobhita lingam*)[186] or as his ear ornament[187] or amulet[188].

Aṣṭottara (108 chantings) and *sahasranāma* (1008 chantings) of various gods and goddesses contain references to several animals. As many as 54 epithets connected with elephant have been ascribed to Gaṇeśa in *Gaṇeśapurāṇa*[189]; nearly 25 relating to bull and wild animals to Lord *Śiva*[190], and 27 connoting lion, eagle, swan and serpent have been attributed to Viṣṇu[191]. Similarly, the other like Lakṣmī, Sarasvatī, Rāma and Ānjaneya, have been eulogized in terms of their vehicular animals in all their symbiotic relationships.

In the words of E.W.Hopkins: " Between man and beast, there is to be only linguistic difference. In other respects, the beast is man's younger brother. Animals were worshipped as great living powers and as ghosts, the power of whom could never be obtained by the human beings. All those animals which gave him the food, have been worshipped as givers of life[192]".

Theriolatry or worshipping animals such as *Vṛṣākapi* and *Garuḍa* in the *Vedas*, *Hanumān*, snake and tortoise in the epics and several other cultic beasts and birds continued successively for several generations.

In consonance with this ethos, several taboos were enjoined against the killing of several sacred animals. Such injunctions were also in the nature of a recognition of the animals' right to co-exist with man, to be loved, nurtured, venerated and worshipped.

It is well-known that emperors, kings and vassals adopted different animals as their emblems. For example, in Karnataka, the Gangas chose elephant, Kadambas—lion, Hoysalas—tiger, Vijayanagar kings—bear and the Mysore kings had a mythical bird called *Gaṇḍabheruṇḍa*[193]. Such emblems were printed on flags, inscribed on coins and carved in temples. Many festivals were organized for honouring these animals, besides nurturing their sanctuaries.

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Birds and Omens

There has been a persistent belief over the centuries that birds have the capacity to indicate the trends of future events. In India, there are even some texts like the *Pakṣiśāstra* and *sakalajantu-śakuna śāstra. Patañjali*, the renowned grammarian, mentions in his *Mahābhāṣya* that good and bad omens could be determined by the flight pattern of birds and the cawing of crows. The arrival, departure, as well as chirping of birds during different seasons and several parts of the day were sought to be interpreted in various ways in terms of omens and folk tales referred to in some regional languages of India, which are replete with such accounts. To cite a few examples of this type of futurology: it is considered as a bad omen if one hears the howling of an owl, or if a crow enters a house which is believed to result in the death of the house-holder. Continuous wailings of a pigeon or a hen, it is also believed, would herald a rainy season, the wailings of a crane in different directions and during different parts of the day would indicate bad omen. There is a view that certain tribes are capable of understanding such wailings. The *Bṛhatsaṃhitā* and other encyclopedic works have given a detailed account of the nature of worship to be performed for deciphering the language of birds. Orthodox Hindus still believe that their departed ancestors would be satisfied only when crows were offered food during funerary ceremonies and other rites, since they also believe that the dead would assume the form of a crow or pigeon as they are regarded as symbols of death. Each bird stood for some attribute : crow, owl and pigeon for sin and death; swan for purity; parakeet, hen and rooster for prosperity and the like.

Several birds were also associated with cults as well as mother goddesses and fertility rites, and certain birds were given a divine status. In the Vedāntic parlance, swan (*haṃsa*) was associated with the Sun and symbolized fertility, knowledge and purity. The etymology of the word *haṃsa* is also interesting. It is split in terms of *sa* and *ahaṃ*. In Vedantic terminology, "*soahaṃ*" means "I am that" (ultimate reality). When the words are reversed, it becomes *haṃsa*—a concept of the union of individual soul with the cosmic soul. A swan glides on waters without being attached to it. In the same way, the sages and *sādhakas* should be detached from worldly attachments and attain the state of *paramahaṃsa* (supreme state).

Bull

The sacred bull, *Nandin* and *Bhṛṅgi* were regarded as the inseparable associates of *Śiva*. The *Rāmāyaṇa*, which describes *Nandin* as having a monkey face, projected it as another form of *Rudra*. *Nandin* also became the snowy white vehicle of Śiva. According to a mythological story, *Rāvaṇa*, the King of *Lanka*, once defeated *Kubera*, the God of wealth, and stole his flowery aerial chariot. While returning to his capital, he created havoc in *Kailāsa*. Śiva deputed *Nandin* to examine, but the latter was pacified by *Rāvaṇa*. *Nandin*, however, cursed *Rāvaṇa* that in his death monkeys should play their role, and *Rāvaṇa* had to encounter this situation. *Nandin* became eventually a tutelar deity for quadrupeds. According to a traditional lore, he was also an official spokesman of *Siva*, and even

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composed the music for the *tāṇḍava* type of dance performed by his Lord; besides, *Nandin's* inaugural stage for performance of *Śiva's* dance. Installation of an idol of *Nandin*, big or small, is common in front of Śiva's temple where it is worshipped by Śaivites. A spotless white bull is dedicated to Śiva and also released in honour of deceased ancestors. The Saivites perform what is known as *Nandi* dance during special festivals. A band of performers or dancers lift up a decorated staff measuring 15 to 30 feet, and dance in a circular fashion, in rhythm with the beating of drums. According to a mythological story, a form of Śiva called *Vīrabhadra*, while destroying the sacrificial altar of *Dakṣa Brahmā*, the father-in-law of *Śiva*, had unconsciously killed several devotees of *Siva* also. Hence, as an act of repentance, Vīrabhadra made the arm of *Vyāsa* as *Nandī* staff with a banner having the insignia of a lion. A symbolism is common in *Nandi* folk dance.

During *Makara Sankrānti* or Pongal festival (middle of January) in south India, attractive and mighty bulls are decorated and taken in a procession, and later let loose for fun. The hero catching the fleeting and the menacing bull would be rewarded suitably. The villagers believe that if such bulls are seized and tied in cow-sheds, people would be free from evil spirits haunting the community.

Serpents

There is no denying the fact that snakes or serpents have evoked awe and wonder ever since the dawn of civilization all over the world. Over the millennia, serpent worship fostered in India, as a cult. In the words of J.Vogel: "But it would be difficult to quote another instance in which it (serpent) takes such a prominent place in literature, folklore and art as it does in India, nor would it be possible to name another country where the development of this cult can be studied during a period, which may be estimated at no less than three millennia"[194].

Generally, serpent worship is performed in order to get prosperity and offspring, since a symbolized union of serpents is believed to be capable of conferring fertility on barren women. Heinrich Zimmer states that "among the powerful motifs handed down to us from Mesopotamian art, the pattern of a snake is that of an entwined one depicted on slabs of stones all over India, whereas in Mesopotamia they appear on the sacrificial goblet of King Gudea of Lagash. The motif must have diffused into India at an extremely remote era before the arrival of the Aryans"[195].

Some theories have been put forth by Eastern and Western scholars with respect to serpent worship. According to one postulate, *nāgas* were not originally serpents but serpent worshippers, an aboriginal race of Iranian family inhabiting Northern India[196]. Contrary to the above statement, it is believed that ophiolatry was practised not only by the Indians, but also among the other nations of antiquity[197]. Another holds the view that *nāgas* belonged to a class of demoniacal beings represented by totems such as swan-maidens and wolves[198], and that they were essentially water-spirits, being personified forces of nature and associated with the Sun and a hooded serpent as a totem[199]. Others view that serpent as a tutelar deity of the residence, like a *Vāstu Puruṣa* and, if a *vāstu*

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sarpa is abandoned from the house, it would bring untold calamity to the owner[200]. Some others are of the opinion that the serpent worship is concerned with water deities, conception and adoration of the mysterious animals[201].

It is interesting to note that the *Yajurveda* pays homage to the serpents thus: 'Homage to the snakes, which so ever move along the earth, which are in sky and in heaven, which are the arrows of sorcerers of free-spirits and which lie in houses, which are in the brightness of heaven, in the rays of the sun, made their abodes in the waters[202]'.

The *Gṛhya sūtras* give an account of *Sarpa Bali* (offering to serpent) for either honouring or warding off evil serpents, which last for months starting from *Śrāvaṇa Pūrṇimā* day and ending with *Mārgaśirā* month. From the above account, we come to know that the serpent rite is performed specially during rainy season, since the serpents would be driven out of their holes owing to inundation of water. There is a general belief that snakes regularly appear at the commencement of the rainy season, which could be due to the magical power of this animal[203].

The *Mahābhārata* story begins with the snake sacrifice performed by *Janamejaya*, who decides to take revenge against *Takṣaka* (the Lord of snakes) and his species, who were responsible for the death of his father. The snakes are forced to come and succumb to the sacrificial fire, and ultimately *Takṣaka* is forced to take shelter in the heaven. Then we find *Vāsuki* calling his nephew, *Āstika*, son of *Jaratkāru*, to proceed to the sacrificial place and prevent the holocaust of snakes killing.

The whole story of the *Mahābhārata* revolves around an act of revenge and retaliation, which ultimately results in the destruction of the evil forces. The *Garuda* myth in the *Mahābhārata* depicts *Garuḍa* as the traditional killer of snakes.

Verrier Elwin has given an account of some myths associated with serpents prevailing in north-eastern parts of India[204]. *Nāga* worship is performed on the fifth day of *Śrāvaṇa* month called *Nāga pañcami*, with religious fervour and grandeur alike as a magico-religious bond between the totem animal and themselves. The myth of *Kadrū* and *Vinatā* might have originated from an ancient animal antagonism in which the chief actors were the snakes and the eagle or the mother of snakes and the mother of eagle, identified with Earth and heaven. *Garuḍa*, the son of *Vinatā*, became the deadly enemy of snakes[205].

Garuda is a phenomenal bird, which in mythology is called *Garutmān Suparṇa* in the Vedic texts[206] as a snake consuming monster. Abbe Dubois says: "It (*Garuḍa*) wages perpetual war upon lizards, rats and especially snakes and when it attacks one of the last named, it swoops down upon it, seizes it and then lets it drop, and following swiftly it picks it up again killed, of course, by its fall, and fly off with it to some neighbouring tree, where it may be devoured at leisure[207]". His massive shape gives the name to a weapon, a type of formation of the army during wars and a fire altar, etc[208]. He fights with *Mayūra dīptatejas*[209]. It is interesting to note that *Garuḍa* became the vehicle of Viṣṇu only after he was defeated in a contest against *Viṣṇu* when he could not move his arm. *Kṛṣṇa* allows him to sit on his flag staff along with *Hanumān* at the time of *Mahābhārata* war[210]. Since *Garuḍa* has a deadly enmity with the snakes, it is an antidote to poison. The knowledge of *Garuḍa* or *Gāruḍividyā* is a science *(Viṣa-vidyā)* to remove the effect of poison.

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Herpatology (Sarpaśāstra)

Lātyāyana, a commentator on *Suśruta saṃhitā,* in his commentary, informs that a person by name Dalvana was known to be an herpatologist during Suśruta's time.

Further, *Kālidāsa* in his drama *Mālavikāgnimitram*, makes a mention of the treatment for snake bites. According to him, the bitten part should be immediately cut off or burnt, or the blood should be let off from the wound (IV. 4). He also mentions that by performing a magical rite called *udakumbha vidhāna,* the ill-effects of a poison can be counteracted. According to *bhairava tantra*, in this method, a jar is filled with water and certain charms are recited. The sacred water is sprinkled later over the part bitten by a deadly snake, repeating the same charm again and again. Sometimes, rings having the insignia of a snake were also used for this purpose.

Daṇḍin, in his *Daśakumāracaritaṃ*, describes about venomous snakes, snake bites, effects of snake poison, snake doctors and charms to overcome the venomous effects. According to an account, an old man, a maiden and her husband were bitten by a deadly black serpent (*darvīkara, Kālabhoġi*). The affected people felt as if their limbs were being affected by the flames of virulent poison, spreading within. The body became stiff, skin turned into dark-blue colour, eyesight became dazed, and warm breath was stopped in them. During such emergencies, snake charmers (*viṣacikitsaka*) were pressed into service. They surveyed the body of a patient, treated him with a talisman (*rakṣābandhana*), or with mystical formalities and charms (*Daśakumāracaritam* IV p. 133 line 1).

Although several medicinal herbs for curing snake poison were in vogue (for e.g. *Sarapagandhi*), none of them has been described fully in the traditional texts. Perhaps, treatment for snake-bite was a closely-guarded secret among the family of snake-charmers and doctors.

The serpents have been represented in the art and temple complex of India. Some temples have many stone images of serpent, generally under the shade of peepal tree. There are temples for the exclusive worship of serpent form called *Subrahmaṇya* or *Kārtikeya*. Even now, in several parts of South India and Mahārāshtra, special worship is performed on the fifth day of the lunar month, *Śrāvaṇa*. In temples at Śrīrangam and Anantaśayanam in Tamil Nadu, the idol of Viṣṇu is reclining on the coils of *Ananta*, the cosmic serpent.

Views of some psychologists : The noted psychologist, Sigmund Freud, has analysed the dream patterns of man, by recording and classifying various objects appearing in the dreams of people. According to him, a snake or a serpent represents virility and sexuality of human beings, and repeated sequences or appearances of a reptile in the dreams indicated that a person is suffering from want of conjugal bliss[211]. Another psychoanalyst, Tom Chetwynd, says: 'The snake in the dream forms various shapes, which depict the dynamic patterns of force. As a circle, it depicts the circle of the Zodiac, which is also the circle of time, and time that heals or cures all ills and leads to death'. He further says that 'the *lingam* (phallus) of *Śiva*, like his body, is wreathed in snakes. Even the intestine in the lower body and the maze of ours are related to the serpent, and the ileum, colon and the

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large intestine are connected with the unwinding and unfolding of revelation through the cycles of time and also the tortuous journey of initiation[212].

Carl Gustaf Jung, analysing such dream patterns in a different way, brands them as patterns of *Archetype*, inherited by us through several generations by our ancestors, appearing in our dreams, and projecting the innate sub-conscious state of our minds[213].

Views of the Neurobiologists : Modern neurobiologists, like Roger Sperry[214], a Nobel laureate, and others are of the opinion that the modern man has inherited the qualities and attributes of all the living beings evolved over a period of several million years. Hence, the characteristics of a protozoan, echinoderms, mollusks, reptiles, amphibians, mammals, and so on, are present in the cells of the human beings at the level of DNA and genes. They exhibit such characters on different occasions and are projected on to the dreams and to the conscious state from the sub-conscious, time and again. The myth involving the serpent is of the same type. Hence, we exhibit fear and wonder with respect to all the animals, and especially the deadly animals like snakes.

Animals in Indian numismatics

Indians had simple exchange system for several centuries. With the first urbanisation of the Harappan culture, there was brisk trade in Egypt and West-Asian countries, through barter or exchange and gift. The Ṛgvedic people refers to metals (*niṣka, swarṇa, hiraṇya, dakṣīṇā*) and their usage in daily life. With the second urbanisation in the Gangetic valley, coins made their appearance, and they were distinguished by regional, cultural, linguistic and political aspects[215]. There were gold, silver and copper coins, either punch-marked, die struck or moulded ones. They contained symbols, and sometimes the reverse of these had several pictures of animate and inanimate objects.

The symbols sometimes denoted some story from Vedic and *Purāṇic* mythologies. The gods and goddesses of the Hindu pantheon were represented on the coins. This began with the *śakas* and Parthians, and continued during the reigns of Kuśāns, Guptas, Chālukyas, Hoysalas, Kākatiyas, Cholas, Mughal monarchs and Mysore Wodeyars. In the early medival period with the exclusion of the portraits, the representation of the gods and goddesses became more prolific[216]. Of relevance to us is the fact that there are certain animal forms inscribed on metallic coins, which perhaps might have denoted some significant cults. In several punch-marked coins (3-4 cent B.C.), a bull, elephant, have been represented on the obverse. On the coins of *Kauśāmbi*, a lanky bull and on those of *Takṣaśilā* elephants and lion. On a coin belonging to Ujjain, the picture of a fish in a pond has been represented. A deer with goddess *Lakṣmī* is found on the obverse of Kuninda class (100 B.C). *Kārtikeya* holding a spear and cock is noticed on Yaudheya (100-200 A.D.) coins. The Indo-Greek coins depict a horseman and bull, Titan holding a dolphin and an elephant. On the Indo-Scythian coins, king on a horseback with a legend in *Kharoṣti* has been engraved (90-40 B.C.).

Trident *Śiva* with a bull at the back of a *kharoṣti* legend is found on Kushan coins. The Ganga dynasty issued coins showing Śiva reclining on a bull and goddess *Lakṣmī*

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riding on an elephant (700 A.D.). The medieval Prathihara kings brought forth coins depicting the *Varāhāvatāra* of *Viṣṇu* (863-882 A.D.). The Ohind rulers issued coins containing a bull, horseman and lion with *Nāgari* legends in *Nāgari* (900-1000 A.D.).

During the reigns of early *Śātavāhana* and *Sālankhāyana* (100-420 A.D.), lion, elephant and bull have been represented on their coins many times. Lion forms the motif on the coins of Viṣṇukuṇḍi (400-500 A.D.), whereas Yadavas(1100 A.D.) had a fascination for lion and bull, which have been depicted on their coins.

The aforesaid dynasties represented *Varāha, Durgā, Nandī, Hanumān, Garuḍa, Viṣṇu, Śiva's* family, *Lakṣmī-Nārāyaṇa, Lakṣmī-Narasimha, Brahmā-Sarasvatī, Kṛṣṇa, Venkateśwara, liṅga, śankha, cakra* on their coins. Alupa dynasty (1499 A.D.) coins show two fish on a lotus. *Kadambas* of Goa (1147-1192 A.D.) depicted lions, while the western Gangās depicted an ornate elephant, *Pallavas* (700 A.D.) a bull with *srīvatsa* symbol, and *Pāṇḍyas* (1070-1120 A.D.) an elephant with riders, as well as a stylish fish. The *Lāṭa* dynasty (1300 A.D.) portrayed a pair of lions, flanked by a pair of lamps[217].

Coins in the Gupta period **:** The Gupta kings issued their coins in gold, silver, copper and lead. They copied the patterns of the Indo-Greek rulers and Kushans. Later, they developed their own system. The Gupta coins represented their clan of kings in various postures and, on the reverse, there was a picture of a goddess. Sometimes, it depicted a motif or a myth or a legend. Conquests, great religious festivals were chosen as special occasions for issuing commemorative coins by the ancient kings, especially Guptas. Based on the central motifs, the numismatists classify them into twenty types. Among them, the coins containing the animal motifs are:- tiger-slayer type, lion-slayer type, horseman, elephant-rider, lion-slayer, rhinoceros-slayer, horseman-lion-slayer, peacock and *Aśvamedha* types[218].

In the tiger-slayer type, the king is seen wearing a short jacket with a *dhoti*, and is adorned with necklace, earrings and amulets, is charging at a tiger with a bow. On the reverse, we find goddess *Gangā* riding a *makara* (crocodile), faces left with all the ornaments[219].

In the horseman type, the king is depicted as riding on a fully caparisoned horse, to his left. He is wearing a *dhoti*, coat, waistband and all the ornaments[391]. In the lion-slayer type, the king is shooting a lion, facing him. In the rhinoceros-slayer type, bare-headed king is depicted as seen riding on a caparisoned horse attacking a rhinoceros with sword held in his right hand, the rhinoceros standing at bay turning back its head. In the elephant-rider type, a bare-headed king is riding on a caparisoned elephant furiously marching ahead. In the peacock type, bare-headed king standing to his left is feeding a peacock facing him. On the reverse, we find *Kārtikeya* being represented with a peacock[220]. In the *Aśvamedha* type, a horse with a neck strap standing towards left on a platform (*vedi*) before a sacrificial post (*yūpa*) with a pennon flying over it is represented. Samudragupta issued several coins of *Aśvamedha* type denoting his victory. The reverse of all these gold coins depict goddess *Lakṣmī*. The reverse of some coins depicted legends or inscriptions. A gold coin of Samudragupta depicts the *Aśvamedha* horse standing in front of a sacrificial post[221]. A gold coin belonging to Kumāragupta I shows that the king is

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playing a lute having mounted a royal elephant, trampling a lion. Another coin depicts a king chasing a single-horned rhinoceros. In some of the coins issued by Samudragupta, the name of the king along with the pictures of a horse and a tiger are represented. A coin of Kumāragupta portrays a king playing with a joyful peacock, having spread its charming feathers[222]. In Indian mythology, lion was symbolic of courage, elephant that of rain and wind, *makara*, the principle of life, Sun and tortoise, being symbols of cosmology.

The symbol of elephant trampling a lion denoted the victory of one king over the other. The king chasing a rhinoceros or goddess *Gangā* standing on a deadly crocodile symbolically represented the expansion of the Gupta kingdom into the whole of the Gangetic region[223], and even to Kāmarūp (Assam).

Coins in the Muslim Period : The representation of the deitis on the coins also attracted the attention of Muslim rulers, especially the Mughul emperors. Akbar and Jahangir brought out coins that had animal symbols. A gold coin of the Mughul period contains a cuckoo and the other had a gibbous bull[224]. Adil Shahi of Bijapur issued a coin containing the picture of a fish hook (1700 A.D.). A rare coin of Muhammad Ghori shows *lakṣmī* on the obverse. Some gold coins of Jehangir depicted Jahangir with a lion. He issued a dozen gold coins representing the Indian zodiacal sign from *Meṣa*(ram) to *Mīṇa*(fish). Haider Ali and Tippu Sultan (1772-1799 A.D.) were so fascinated by the coins of Vijayanagar kings and Mysore Wodeyars that they issued coins which had the emblem of an elephant, *Śiva-Pārvatī* and *Śringerī Śāradāmbā*[225].

The Indian coinage has had cultural, religious, mythological, linguistic and regional distinction, and represented the Vedic and *purāṇic* myths. They have even shown over the centuries rich and diversified Indian fauna, besides denoting the conquests and victories of emperors and kings in a symbolic way.

Animals in art, architecture and sculpture

The Indian art is the replica and the essence of its civilization. The Indian doctrine of *karma* and transmigration of soul impelled the artists and sculptors to visualize the animal life in its rich diversity for representation[226]. During the reigns of the Mauryas and the Śungas, themes such as animal forms and movements gained representation. Hunting expedition (*mṛgayā vinoda*) is portrayed with great felicity in the Rani Gumpha cave at Udayagiri. Owing to the impact of Buddhism, several stupas depicting the life of the *Buddha* and *Bodhisatva*, drawn from *Jātaka* and *Avadāna* stories were erected during that time. In a sculpture from Bharhut in Madhya Pradesh, *Māyādevī* is portrayed as if dreaming a white elephant entering her womb[227]. Another panel from a rail pillar shows the Nāgas showing their obeisance to the *Buddha* (200 B.C.). Animals with human feelings and gestures have been portrayed in several fables at Bharhut. Ancient and medieval Indian architecture shows *Yama* mounted on a buffalo, holding a *Yamapata* in his hand.

Yakṣas and *Yakṣis* (semi-divine beings) riding an imaginary animal such as an elephant or a horse with their hinder parts appearing like a fish are seen in many ancient

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temples of India. The early phase of Kushan art shows animals being depicted at Mathura, Bhuteshwar and other places[228]. A rail pillar from Bhuteshwar contains a *Yakṣī* conversing with a parrot and awaiting the arrival of her lover[229].

The artists of the *Śātavāhana* period borrowed the themes from the lives of *Bodhisatva* and the *Buddha* from their predecessors. Such monuments can be seen in Amaravati. In one of the Gandharan sculptures, we see. *Devadatta*, the cousin of the *Buddha*, unleashing a reign of terror by letting loose *Naḷāgiri* the wild tusker. The right half of the panel shows the elephant creating a chaos and confusion, whereas the left panel depicts the same elephant kneeling before the *Buddha* quietly[230].

The excavations at Kaushambi have unearthed the heads of terracotta horses. The front and back portions of the eastern Gateway at Sanchi show many animals in various moods and movements. There are winged lions, goddess *Lakṣmī* backing the elephants. A pair of peacocks, mounted bulls, goats, and other animals are facing each other[231]. A sculpture from Bhuteshwar depicts a flying horse (Mathura 200 A.D.). In the Buddhist art, the horse symbolized the great departure from the world of grief, turmoil, endless desires, to the realm of pure knowledge and tranquility[232]. The array of animals at Sanchi Stupa testify that Buddha had treated them in equanimity. Chariots being drawn by a horse are depicted at Bhāja, Bodhgayā, Mathurā, Ellora and Gangāsāgar (1200 A.D.). Several exotic horses have been carved on the Southern side of the Sun temple at Konark[233] (1300 A.D.).

Sānci Stūpa shows a magnificent bull elephant with its calf. A frieze of elephants is carved at Karla and Kausala at Ellora. A unique sculpture at Gangaikond Cholapuram belonging to 1100 A.D. shows a great python swallowing an elephant[234]. Lions attacking elephants is a common theme found in several sculptures in South India, denoting the victory of one king over the other.

Innumerable elephant images had been carved in the Kailasanatha temple at Ellora also(750-850 A.D.). The medieval temples depicted miniature figures of the elephants compared to the gigantic ones at Karla, Mahabalipuram, Elephanta and Ellora caves [235]

Cow appears for the first time in Kulli ware (2300 B.C.). Cow with a calf is seen in Sanchi pillar[236]. The Kṛṣṇa relief at Mahabalipuram (700 A.D.) shows a cowherd, cow and milking calf. The Kṛṣṇa relief preserved in Mathura museum shows *Kṛṣṇa* being surrounded by a herd of cows[237]. The artists of the Pahari school painted the cows in all their hues and splendour[238].

The pillar at Sārānāth depicts the bull along with an elephant, lion and horse. They represent the four quarters[239]. The bull was a symbol of Jain Tirthankara Ṛṣabhadeva, and hence one can find it in the Kālasūtra paintings. With the steady growth of Śaivism, bulls became predominant, and were carved in large numbers in temples all over India. Thus, we have recumbent bulls in Mahabalipuram and Ellora. Gigantic sculptures of bull on Chamundi hills in Mysore, Basavanagudi bull in Bangalore, and bulls in all the *Śiva* temples are conspicuous. Bharhut and Mathura (100 B.C.) sculptures show human-headed bull. The Chalukyans, the Cholas, Vijayanagar and Central Indian rulers devised a rare fusion of bull and elephant, and portrayed them on temple walls[240].

Lion was represented for the first time in the pottery of Nundara (2000 B.C.). Later, Harappan terracotta revealed lion with two heads. The lions adorned the Ashokan,

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Sarnath, Amaravati stupas and the temples of Orissa during the medieval periods[241]. A roaring lion is found in the Ranganatha temple at Bhatkal. It denoted the destructive fury of the goddess *Mahiṣamardini*[242]. A fabulous animal with a fusion of several animals composite in nature called *yali* is described in Sangam literature of Tamil Nadu. Symbolizing the life force, it is depicted in most of the south Indian temples[243].

Among the winged birds, *Viṣṇu* riding on *Garuḍa* sculptures are found from the Kushan periods. All *Viṣṇu* temples were adorned with *Garuḍa* as seen from the Chalukyan temples of Aihole, Pattadakal & Konark. The Rāṣṭrakūṭas, Paramāras and Vijayanagar kings used it as a symbol on their seals, copper plates and coins. The Keladi kings represented a mythical figure, *Gaṇḍabheruṇḍa* (human figure with a double bird head) on coins, temples, and it was symbolic of great strength and destructive ability[244].

Nāgas with several hoods have been portrayed at Sanchi (200 B.C.) and Nagarjunakonda (200-300 A.D.). The zoomorphic form of *Nāga* is found in the Bharhut sculpture[245]. The anthropomorphic form of Nāgas is found in Pallava temples at Mahabalipuram and Kanchipuram[246]. Rajivalochanam temples at Rajim, Khumbhaśyām temple at Rajasthan and Kailasanatha temple at Kanchipuram portrayed coiled serpents on their panels and pillar-shafts[247]. A pair of fish holding cord or two *makaras* facing each other is a repetitive theme found in many temples of India. *Vasundharā*, the Mother Earth, holds fishes in one of her hands[248]. Symbolically, *Makara* is the essence of water, *Madana* is symbolic of fertility, and hence it was ascribed as a vehicle to God *Varuṇa*, *Yakṣa* couple and *Gangā*[249]. Laksmaneshwar temple at Bhubaneshwar (700 A.D.) portrays a crocodile, whereas Bharhut depicts a *Timingala* or a whale attacking a boat [250].

The deer, which is symbolic of spirituality and gentle nature, is seen on the Mohenjo-daro seals. A pair of deer is represented at the feet of *Paśupati*. Jaina texts reveal that the great *Ācārya Śāntinātha* adopted this animal as his symbol. Cave number 17 at Ajanta shows a pair of deer facing each other in the presence of *Buddha*[251]. Deer of several sizes are seen at Sanchi, Bharhut and Mahabalipuram. Monkey found a place in the *Rāmāyaṇa* panels at Konark, Hampi and Mahabalipuram temples.

The peacock first appears in the burial urns of Harappa. The *Buddha* as a peacock was portrayed at Amarāvati. They adorned the Stupas of Sanchi and Mathurā[252]. Swans in many moods are represented on decorative panels from the Mauryan times.

Ancient Indians considered the horns of animals as an emblem of formidable strength. Hence, gods and goddesses were portrayed with a pair of horns on their heads. Horn is also a fertility symbol. The Indus valley terracotta figurines showed *Paśupati* with horns[253]. The horns also played a significant role at the time of coronation. *Mahābhārata* says that *Karṇa* was coronated by pouring holy waters on his head from the tusk of an elephant, and horns of bull and rhinoceros[254].

The *Hoysaḷa* temples (1200 A.D.) at Hampi, Belur, Halebid, Somanathpur and other places revealed architectural marvels. They had a general pattern, and the base of these temples had a carving of the rows of elephants, elephant riders, *Makaras* and swans. The predominant sculpture in these temples was that of *Sala*, the propounder of the *Hoysaḷa* dynasty, fighting the tiger[255].

Gurjara *pratīhāra* kings (800 A.D.) portrayed the ten manifestations of *Viṣṇu*, the *Rudras*, *Sūryas*, and the marriage of *Śiva* and *Pārvatī*, on the walls of the temples. A

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sculpture of that period (800 A.D.) depicts *Varuṇa* with his consort *Vāruṇi* seated on a *Makara*[256]. During the same period, the Bengal sculptors of the Pala school chiselled magnificient bronze idols of dancing *Nataraja*[257]. The artists during the Chera and Moghul periods painted opulent paintings on large canvas. In one of the Moghul miniature paintings, we see emperor Akbar watching the seizure of a wild tusker near Malwa[258]. Sixteenth and Seventeenth century paintings show mahut and a tusker, an Ibex, episode from the *Bhāgavatapurāṇa* and Śiva sitting on the back of bull and tigers[259]. In the words of Bharatha Iyer , "Bharhut, Sanchi are virtual jungle books revealing the innate love of the Indian artist for the animal, which is reminiscent of Harappan culture"[260]. As Mario Bussagli has rightly observed, "the art of India had man, animals, plants and flowers as its subjects. Representation of the deities unfailingly combined with some hint of nature, whether it be a flower, a bird or an animal "[261].

Through the representation of animals, the Indian artists and sculptors portray the evolution of the Buddhahood from the *Bodhisattva*. They captured the nature and the behaviour of animals through their panels and reliefs. The fabulous and mythological animals such as *Makara*, Unicorn, *Vyāla* and *Yali* were the creations of the deep unconscious, emerging as dream like realities. They, the embodiments of nature's mysterious forces, disciplined to ordered behaviour by the might of the divine power, observes Bharata Iyer[262].

Thus, the Unicorn motif of the Harappan culture slowly recedes to the background, and animal behaviour is well-documented in the evolution of Indian art. Later, important animals and Purāṇic myths occupied the Indian art.

Memorials for animals

It is indeed interesting to note that memorials were erected for honest and courageous pets all over the country, by engraving on stone the heroic deeds of stone animals. One such inscription, called the Atakur inscription written in old Kannada language, has been preserved in the Government Museum of Bangalore. It was discovered in Bhilleshwara temple at Atakur in Mandya district of Karṇātaka belonging to 950 A.D. It depicts the picture of a robust hunting dog fighting with a wild boar. The epitaph says that the name of the hunting dog was *Kāḷī*, and it belonged to Marālarāta, a soldier and a trusted lieutenant of Būtuga, the vassal of the Ganga dynasty. It has been described that Marālarāta during a hunting expedition, encountered a herd of wild boars. *Kāḷī* fought fiercely and killed several boars thus saving the life of its master. Finally, it courted death at the hands of a deadly boar. The master bemoaning the death of *Kāḷī*, later erected a monument in its name. He commanded that *Goravas* (a class of tribe) should do the worship to that animal, and even donated several acres of fertile land on the banks of *Malli* channel. The above inscription reveals the emotional and humanitarian bonds with men and animals[263].

Animals in the medieval period

The Muslim rulers of India were great hunters, and kept a big menagerie of both wild and domesticated animals. Salim Ali has given an extensive account of the love and passion

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of the Mughul kings towards animals, starting from Babar to Aurangazeb[264]. Babar compiled a comprehensive gazetteer of Hindustan, and documented the flora and fauna. He was fascinated by the single-horned rhinoceros and hunted it frequently. Akbar the Great (1556-1605 A.D.) was fond of several species of animals from Persia, Turkestan and Kashmir, and bred several domestic animals. It is on record that he possessed thousands of cheetahs, leopards and hunting dogs[265]. He trained some birds of prey, such as *baz, shahin, sringar and falcon.*

Jahangir (1605-1627 A.D), an ardent naturalist, evinced keen interest in the variegated fauna of India. He made deep studies of the nature, as well as behaviour of animals, and made experiments on the animals kept in his menagerie, recording his observations in Persian language. He commanded his notable court artist, Ustad Mansor, to draw and paint the animals with accuracy and delicacy. This original contributions in this field were studies with respect to *Sārasa* crane and the gestation period of elephants, dissection of animals to know the internal organs, their weight and form[266]. And he always personally observed, examined and arrived at conclusions. He also made a classification of birds and other animals depending on their geographical distribution. Jahangir's animals can be broadly classified as mammals, reptiles and aves. They are:- wild Ram (*Ovis cyclaceros*), wild Boar (*Capramegaecsro*), Himalayan Ibex (*Capra sibirica*), Antelope (*Tetraceros qudri cornis*), Red deer (*Cerbus elaphus maral*), Yak (*Poephagus grunniees grey*), Zebra (*Equus zebra*), Slender loris (*Loris tardigradts*), Monkey (*Maca custcynomogus*), Langur (*Semnopithecus entellus*), Elephant (*Elephas maximus*), Pole cat (*Putorius sarmaicus*), Wolf (*Cannis lupus*), Leopard (*Felis jubata*), Tiger (*Felis tigris*), Indian python (*python molurus*), king cobra (*Naja hannah*), scaleless fish (*Singhara machhli*), chinkara (*gazelia benetti*), flying squirrel (*patavrista oral*). The birds were black partridge (*Francolinus asiae*), common grey partridge (*F.pondicerianus*), Impeyan pheasant (*Lophophorus impejanus*), common red jungle fowl (*Gallus bankiva*), western horned pheasant (*Tragopan melanocephalus*), Himalayan snow cock (*Tetragallus himalayenis*), Domestic turkey (*Theleagris gallapova*), Crane (*Anthropoides virgo*), Sarus (*Antigua*), Dipper (*Gaclus gnclus*), Hawk cuckoo (*Hierococcyx varius*), Koel (*Eudynamis scolopaceus*), Loriquet (*Coryllis vernalis*), Lammergeier (*Gypaetus barbatus hemachalnus*), Bustard (*choriotis nigriceps*), stork (*ciconia episcopus*), stone curlew (*Burhinus oedicnemus*), pelican (*pelecanus philipensis*), Goose (*Anser*), Greenpigeon (*corcupus phoenicopterus*), sunbird (*Nectarina*), Tree pie (*Dendrocitta vagabunda*), Black Robin (*saxicoloides*), lapwing (*lobi vanellus*), shrike (*Lanius*), wood pigeon (*Columba palumbus*) etc.[267].

Primitive man was indeed afraid of wild animals attacking him consistently. He became a ferocious hunter in order to save his existence. He killed various animals by means of trapping, fire-driven, following their trials and many more. In the process, he invented various types of tools and fire. As he grew intelligent, he could differentiate between carnivorous and herbivorous animals, ferocious and mild-natured animals.

Crude and fine tools, as also management of fire gave him tremendous courage and security. Now, he settled down in caves, make-shift tents, various types of houses depending upon the nature of local climate and materials. He learnt to domesticate animals, and thus cattle sheep, goat, pig, dog and others became his constant companions. During the Neolithic ages, the cultural evolution of mankind mainly depended on

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agriculture, and the exploitation of domesticated animals for food and sustenance, wheat, barely basic cereals such as rye, flax, millet had been domesticated during that developing period.

In perspective, while ferocious baffled primitive man, he began to deify several animals, invented totems and taboos, and these symbolized his ideas regarding supernatural beliefs. Later, those animistic myths became a part of religious mythology. Among all the religions, Hindu religion appears to have developed an extensive animal-related mythology. Even demons in the form of animals became a part of this mythology, and various gods and goddesses assumed even mightier forms to vanquish such demons.

In course of time, certain animals became the objects of sacrifice as well as vehicles (*vāhana*) for gods and goddesses. The concept of a *vāhana* is reflected throughout the developing phase of the Indian art. The animals were depicted with symbolism, and thus zoomorphic and theriomorphic forms of animals emerged on the scene. Such a depiction reveals the inter-relation between man and animals on the one hand, and his own concept of god and goddesses on the other. Behind this attitude perhaps lay the *eco–friendly co-existence*. It would appear that the veneration of animals was not permissive of a detailed examination of anatomical strictures, habits and habitat, although there existed an empirical knowledge among our ancestors.

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41. I.4.14.12; I9.45.2.
42. VII.4.69.1.
43. I.22.162.1.
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CHAPTER 22

The Ṛgvedic Soma Plant

Rajesh Kochhar

Soma is a celebrated plant in the *Ṛgveda* as well as in *Avesta*, where it is called Haoma, later shortened to Hom in Pahalvi. A drink of the same name was extracted from the plant by pressing or crushing its stalk for offering to the gods and for drinking. (The name *Soma* comes from the root su, "to squeeze".) Significance of the Soma cult is apparent from the fact that the *Ṛgveda* devotes a full *maṇḍala* to it.[1] The ninth mandala comprises 114 hymns, composed by different authors, but all addressed to Soma Pavamana, the purified Soma. The Ṛgveda's longest hymn (RV 9.97) belongs to this *maṇḍala*, which was prepared by taking out relevant hymns from the other *maṇḍalas* and arranging them according to metre. There are only six dedicated Soma hymns outside the ninth mandala. In addition, there are numerous references to Soma in other hymns; the *Ṛgveda* is, so to speak, permeated by Soma[2].

The Haoma plant figures in three hymns (9-11) in the *Avesta*. *Yasna* 9 is called the Hom Yast, while Yasna (10.18) uses the term Haoma's Gāthas. The use of the term Gatha is significant because the Yasts, believed to be composed by Zarathustra himself, are designated Gāthas. Interestingly, the Zarathustrian Gāthas do not make any reference to Haoma.[3]

While Haoma is offered to all the gods, Soma, also called Indu, is particularly associated with Indra, who handsomely rewards his worshippers.[4] The Ṛgvedic and Avestan mythologies associated with Sóma/Haoma run parallel. Soma/Haoma is of celestial origin. In the *Ṛgveda* (RV 4.27.3;9.72.2), an eagle or falcon brings it to the earth against the wishes of the celestial guards like Kṛśānu, who is known to the Avesta as Keresani (Yasna 9.24). In RV (8.12.16), Indra drinks Soma by Trita Aptya's side. Vālakhilya (4.1) mentions Vivasvat's son Manu and Trita among the ancient sacrificers, whose Soma had once pleased Indra. The Hom Yast lists the names of early Haoma-pressers, which in Sanskritized form are *Vivasvat,* the father of *Yama; Aptya*, the father of *Traitana;* and *Trita*, whose two named sons are not known to the *Ṛgveda*.

The *Ṛgveda* makes a sharp distinction between those who press Soma and those who do not: "You scattered the settlement of the non-pressers, maintaining your upper hand

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as the Soma drinker" (RV 8.14.15). 'May we win in fights over those who do not press [Soma]' (RV 1.110.7). There is a rivalry among the Soma drinkers themselves, with different sacrificers aimed at enlisting Indra's support. 'When you have mounted on your car, let your yoked Boy Steeds carry you past other men's libations' (RV 8.33.14). Or, more simply, 'Let not other sacrificers hold you' (RV 2.18.3). A specific instance of rivalry within the Soma club is provided by RV(7.32.2): 'Indra preferred Vasiṣṭha's to the Soma pressed by *Pasadyumna Vayata*'.

Attributes

Soma is the mascot of the Aryans. Whatever the Avestan and the Ṛgvedic people needed or wished at individual and collective level, they asked Soma/Haoma to provide. Soma/Haoma is thus perceived as a giver of immortality, a healthy and long life, offspring, happiness, courage, strength, victory over enemies, wisdom, understanding and creativity. The attributes of Soma/Haoma fall into two categories. The culture-specific attributes tell us about the needs, fears, wishes, aspirations and accomplishments of the Ṛgvedic and Avestan people. The role assigned to the Soma plant is incidental; these attributes could easily have been endowed on any other plant. In contrast, there are the object-specific details, which tell us about the plant itself.

First, the culture-specific attributes. According to *Yaśna* (9.23), Haoma grants good husbands to maidens. In RV(8.80), a maiden, Apālā by name, plucks Soma twigs by the wayside and chews them with the purpose of becoming attractive to men. Haoma provides brilliant and righteous offspring to pregnant women (Yaśna 9.22). Anyone who maltreats Haoma is cursed to remain childless (Yaśna 11.3). As if aware of this, in ṚV (8.31.5), 'with constant draught of milk, husband and wife with one accord press out and wash the Soma juice', no doubt as a prelude to sexual intercourse. The Soma drink enables the poetic drinker to compose a hymn. Therefore, Soma is very frequently called a Kavi, poet. Soma is 'the procreator of thoughts' (RV 9.95.5), and is ṛṣikṛt, 'the maker of seers' (9.96.18). In RV (9.107.18), 'the poet Soma procreates the thought'. The composer of RV (3.43.5) plainly asks: 'Will you not make me the protector of people, make me the king, O Soma-drinking lord, make me the ṛṣi after I have drunk of Soma? Will you not give me of the excellent *Amṛta*?'

In addition to these psychological attributes, we obtain some valuable object-specific physical charcteristics. Soma prevents sleep; it keeps the drinker awake and alert[5]. 'The Gods seek him who presses out the Soma; they desire not sleep. They punish sloth unweariedly' (RV 8.2.18). Indra is awake, because he has drunk Soma (RV 8.92.33). Soma is *jāgṛvi* (awake) (RV 9.36.2; 9.44.3; 9.106.4).

It seems that some of the Ṛgvedic poetry was composed at night after drinking Soma. As RV (5.44.14) puts it, 'the sacred hymns love him, who wakes and watches; to him who watches come the *Sāman* verses. This Soma says to the man who watches, I rest and have my dwelling in the friendship'. In RV (9.97.37), Soma is awake and has become 'a singer most like *Aṅgiras*'. In the same creative spirit, the poet in RV (8.48.14) wishes that neither sleep nor idle talk should govern him after he has drunk Soma. Soma's ability

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to keep one awake was known outside the poetic circles also. To the gambler in RV (10.34.1) the die that never sleeps is dearer than the deep draught of Soma from Mūjavat.

Of all the Indo-Europeans, the Indo-Iranians are the only ones who took to composing (and preserving) hymns. One wonders whether this is due to Soma. Soma is called an ancient plant (RV 9.98.11). It was a matter of pride to have Soma drinkers among one's ancestors. 'With you, O Soma *Pavamāna*, our wise fathers conducted their affairs' (RV 9.96.11). Similarly, 'Our Soma-drinking fathers, the most excellent ones, who came for the Soma drink' (RV 10.15.8). Does this mean that in the community there were members, whose ancestors had been outside the Soma fold?

The Soma/Haoma tree was leafless. The juice was extracted from the shoots or stalks, never from the fruits or berries. A number of terms are used to denote the stalks: *aṃśu* (literatlly "ray"), *kṣip* ("finger"), *vakṣaṇa* ("tube"), *vana* ("cane"). All these terms indicate that the shoots were long and thin. In the *Avesta*, the shoots are called *asu* (corresponding to *amsu*). The term *frasparega* is also used where the word without the prefix 'fra' corresponds to the English sprig. The processs of juice extraction is called milking in the *Ṛgveda*, no doubt, owing to the resemblence between the stalks and the cow's teats. The term *kṣip* is particularly apt, because the stalks, like the fingers, had joints, called *parvan* or *parśu*.

The colour of the stalk was ruddy (*aruṇa*), brown (*babhru*), or golden (*hari*), corresponding to *zairi* in the *Avesta*. (In the *Avesta*, the plant is called Haoma-zairi to distinguish it from three other Haomas, persons or deities.)[6] A very important characteristic of the Soma plant is that it was sweet-scented (*Yaśna* 10.4, RV 9.97.19; 9.107.2).

The *Ṛgveda* (but not *Avesta*) uses the term *andhas* to denote the whole plant as well as the extracted juice[7]. The significance of the term lies in the fact that it is cognate with the Greek word *anthos*, meaning flower. Here, then, we have an old Indo-European word with a change in meaning.

The Ṛgveda names a number of localities, where Soma was consumed: *Ārjikā, Pastyāvant, Śaryaṇāvant, Suśomā* (a river), etc. Unfortunately, it is not possible to identify any of them[8]. An important piece of information is that Soma grew in the mountains. This fact is mentioned or alluded to in a number of places in the *Ṛgveda*. Thus, Soma is called *parvatāvṛdh*, 'mountain grown' (RV 9.46.1). (In the *Atharvaveda* (3.21.10), the mountains are called *Somapṛṣṭha*, 'carrying Soma on their back'.) RV (10.34.1) uses the term Soma *Maujavata*, 'the Soma from Mūjavat'. The latter according to Yāska's *Nirukta* (9.8) was a mountain[9].

Yaśna (10.10) mentions *Haraiti Bareza* (also called Hara Barazaiti) as the Soma habitat. *Haraiti* is identified with Mount *Elburz*. But it must be borne in mind that the name *Elburz* not only denoted the present Mount Elburz, a peak in the Caucasus, but was applied to the whole range of mountains, extending from the Hindu Kush in the East to the Caucasus in the West[10].

Yaśna (10.17) quotes Zarathustra as saying, 'I praise all the Haoma plants, as many as there are on the high plateaus of mountains, as many as there are in the depths of the valleys, as many as there are in the gorges, which are tied into the bundles of women'.

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Interestingly, while the *Avesta* shows familiarity with a much larger Soma-growing area than the *Ṛgveda*, it is the *Ṛgveda,* which displays greater variety as regards the colour of the shoots.

The Soma ritual, though elaborate, comprised a number of simple steps: extraction of juice, its collection, purification, modification, libation and consumption. It is clear from the Ṛgvedic references that Soma pressing took place three times a day : in the morning, at noon, and in the evening. Yaśna (10.2) refers to only two pressings a day.

There were two methods of extracting the juice from the Soma stalks. One could use mortar (*ulukhala*) and pestle (*mantha*) for processing the plant. In RV (1.28.3), a woman uses the mortar in preparing the drink, and refers (RV 1.28.5) to a similar practice in 'house after house'. To the extent it is permissible to generalize from a solitary hymn, mortar with pestle was the preferred (more convenient?) method of preparing the drink by the house-holders. Significantly, the Avestan practice was also to use a mortar, called havana (*Vendidad* 14.8).

A woman 'pushing [the pestle] backwards and forwards' had no place in the ritual. The ritualistic practice was to pound the stalks between two stones held in hands. The stones, called *adri* or *grāvan* (in singular), were held in high esteem. Three hymns (RV 10.76;10.94;10.175) are dedicated to them; in addition, these stones figure in many other hymns. The stones were pounded with loud sound to scare away the evil spirits. At least in the later rituals, holes were bored to increase the sound. The stones were placed on cow-hide (*tvac*), which acted as a receptacle for the juice. Sometimes, the stalks were soaked in water to increase the yield (RV 9.75.9).

The next step was to purify the juice. This was done by passing the juice through a strainer made of sheep's wool. The most common designation for the Soma juice passing through the strainer is *pavamāna* or *punāna*, the action itself being denoted by the verb *pū*. (It is significant that in Punjabi, the word for straining is punanā as against *chhānanā* in Hindi.) The juice was of the same colour as the stalks and of the same scent as the plant (RV 9.97.19; 9.107.2). It could be taken either pure or mixed with other ingredients. The pure, unmixed Soma, called *śukra* or *śuci*, was offered to *Vāyu* and *Indra*. *Vāyu* is called *śucipa* (RV 7.90.2,etc) and *śukra-pūtapā* (RV 8.46.26); both meaning 'pure-drinker'. Vāyu and Indra are jointly called *śucipa* in RV (7.91.4). A number of substances were available for addition to the pure Soma juice, described as *tīvra*, (astringent): milk, curd, water, barley, clarified butter (ghee), and perhaps honey. For later reference, we may note that poppy or cannabis was never added. In the whole procedure, there was no time for fermentation, nor was any fermented beverage (*surā*) ever added to Soma.

Substitutes

There is a striking similarity between the Vedic *agni-ṣṭoma* and the Zoroastrian Haoma ceremony, both of which must therefore have originated in the (common) Indo-Iranian period[11]. In the Brāhmaṇa period, the Soma plant ceased to be a commonplace. It became a prized item in the ritual, which was difficult to procure, and so was first rationed and then substituted. In the *Baudhāyana Śrauta-sūtra* (6.14), the *adhvaryu* asks the seller if

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the Soma came from *Mūjavat*, which obviously was still a source of supply. In the Yajurveda (*Maitrāyaṇī-saṃhitā* 1.160), the sacrificial offerings are hung from a tree with the words, 'This is your portion, O Rudra! With this food pass by beyond the *Mūjavat*'[12]. By now, *Mūjavat* is the civilizational outpost, beyond which lay the unknown.

Katyayana's *Srauta-sūtra* (10.9.30) enjoins the priests not to give the genuine Soma to a *Kṣatriya* or a *Vaiśya*, even when it was available. They should instead be given the juice of the fruit of the *nyagrodha* tree (*Ficus indica*, now called Ficus *bengalensis*, the Indian fig)[13]. Śatapatha Brāhmaṇa (4.5.10.2-6) lists the substitutes for use in the ritual, when Soma is not available. In decreasing order of preference, they are the Phalguna plant with the red blossom; the Śyenahṛta plant; the *Ādāra* plant; the reddish Durva plant; or as the last resort, any of the golden-coloured grasses[14]. The explicit mention of red and golden suggests that the substitutes were chosen to resemble the original Soma in one parameter, the colour. Also, the cow to be given as the price for Soma should be red-brown with red-brown eyes, no doubt, because this was the Soma colour (*Śatapatha Brāhmaṇa* 3.3.1.14)[15].

The Soma substitutes are linked to the original Soma through mythology. When *Gāyatrī* was bringing Soma, a shoot fell down and became the Śyenahṛta plant. When the head of the sacrificial victim was cut off, the *Ādāra* took shape from the juice squirting forth from it. Therefore, *Ādāra* can be used in place of Soma[16].

The choice of the Soma substitute was not unique, but depended on the school. *Tāṇḍya Mahā-Brāhmaṇa* (9.5.1-3) recommends the use of the putika creeper (*Guilandina bonduc* or *Basella cordifolia*). Or else, the dark grass known as *arjunāni* could be used. Various other substitutes figure in the Brāhmaṇas; *śyāmaka* (cultivated millet), *muñja* grass, *kattṛṇa* (a fragrant grass), and *parṇa* (a sacred tree, *Butea frondosa*)[17].

The Brāhmaṇas reverentially reserve the name Soma for the original Ṛgvedic plant and talk of its substitutes. The reverence disappears in the later period, when the term Soma becomes free of all encumbrances, and is applied, normally suffixed with *latā* or *vallī* (meaning creeper), to local plants (these terms do not figure in the *Ṛgveda*). There must still have been some memory of the original plant, because like the Ṛgvedic Soma, all Soma-latās and Soma-vallīs are leafless with fleshy stems.

At the same time, the original Soma became a mythical plant. The Vedic commentators and Sanskrit lexicographers freely speculated on Soma. *Amara Siṃha*, the earliest of the Indian lexicographers (c.AD 450), lists many synonyms of what he calls *Soma-vallī*, and also describes a plant *Soma-rāji*. *Śabarasvāmi*, in his commentary on the *Pūrva-mimāṃsā-sūtra* (2.2.17), calls Soma a creeper that yields milky juice. The milky attribute was probably based on the *Ṛgvedic* statements that Soma was mixed with milk[18].

Even the medical texts give fanciful descriptions. *Suśruta-saṃhitā* (29) says that although originally there was a creation of one *Soma-vallī*, it was later divided into 24 varieties, one smelling like ghee, the other having leaves like those of garlic, still others looking like cast-off snake skins, etc. Both *Susruta-saṃhitā* (29.21-22) and *Caraka-saṃhitā* (1.4-6) claim that Soma had 15 leaves, which appeared one per day during the waxing moon (*śukla-pakṣa*), and dropped off one by one during the waning moon (*kṛṣṇa-pakṣa*)[19].

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To sum up so far, the Ṛgvedic Soma (as well as the Avestan Haoma) is a scented leafless plant with thin and long jointed juicy stalks, which grew in the mountainous region. The juice was extracted by pressing the stalks and drunk unfermented. In effect, it was energizing, invigorating and anti-sleep. The *Brāhmaṇa* texts preserve the memory of the original Soma, and prescribe various substitutes which ranging as they do from grasses to trees are unable to provide any clues to the master plant. In the later period, while on the one hand the original Soma was mythified; on the other, the name Soma, often with a suffix, was given to a localy available field plant, usually a creeper.

Identification

The question of identity of the ancient Soma was taken up in the wake of ever increasing European commercial and colonial interest in India and its neighbourhood. There is no gainsaying the fact that the Soma studies constitute the most disappointing part of the Indic scholarship. Instead of asking the question as to what the Ṛgvedic Soma/Avestan Haoma was, the studies were begun from the wrong chronological end. As part of the natural history survey, that was progressively carried out in conjunction with the British territorial expansion, Latin names were assigned to Indian plants and juxtaposed with their native names ascertained from local informers. This is how the various *Soma-latās*, *Soma-vallīs* and *Soma-rājis* all over the country came to acquire their botanical names. Next, one or the other of these plants was boldly declared to be the plant of the ancient texts. In the absence of collation of the diverse field data and of any worthwhile acquintance with ancient texts that could constrain free flights of fancy, Soma was reduced to a mere Sanskrit name that could be tagged on to any of the superficially resembling plants. Somehow, an acquaintance with the Latin name of the plant gave the whole exercise a scholarly look.

In the whole debate lasting two centuries, not a single idea was rejected for good as being untenable, nor was any accepted as constituting received wisdom on the subject. The debate remained open, superficial and repetitive with the participants responding to each other rather than to the primary source material. Beating about the Soma bush became a badge of scholarship for a large number of European travellers and officers. Since the agenda was defined by dilettantes, even serious scholarship lost its moorings.

Historically, the European notice of Soma/Haoma began in 1771 with Du Perron's French translation of the *Avesta*. Du Perron quoted Farhang Jahangiri to say that Hom is a tree which grows in Persia in the mountains of Shirwan, Guillan, Mazendran and the neighbourhood of Yezd. It resembles sweet heather, its knots are very close to each other, and the leaves are like those of jasmine. He went on to say that Hom did not grow in India and that 'the Dasturs of India are in the habit of sending at the end of a certain season two Parsees to Kerman to search for the branches of Hom'. The continuity in the Zoroastrian tradition provides a very valuable clue[20]. At that time, however, neither the Ṛgvedic Soma nor the Indo-Iranian connection was known. Du Perron's first-hand account therefore went unnoticed.

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The first mention of Soma in English appeared in 1784 in Charles Wilkins' translation of the *Bhagavad Gītā*. In a footnote, Wilkins added that Soma was a creeper the juice of which was drunk at the conclusion of a sacrifice. The first attempt to identify Soma was made by [Sir] William Jones in 1794, who proposed that Soma was a mountain-rue.

Twenty years later, the exercise shifted from the library to the field. William Roxburgh, the first official superintendent of the East India Company's botanical garden in Calcutta during 1793-1814, prepared a catalogue of its 3500 plants. This catalogue, called *Hortus Bengalensis*, was published in 1814. (His magnum opus *Flora India* came out in 1832). Roxburgh identified the plant, locally known as *Soma-latā* with *Sarcostemma brevistigma* (=*Asclepios acida*), 'a leafless bush of green succulent branches, growing upwards with flowers like those of an onion'. He also pointed out that a different plant, a rue called Ruta graveolens, was also called *Soma-lata*. More importantly, he observed that Himalayan plants do not grow in Bengal[21]. This point, of significance in the understanding of ancient texts, was ignored. The *Sarcostemma* saga had begun.

Sarcostemma juice, however, presented a problem. It was noted in 1832 that 'native travellers often suck the tender shoots to allay their thirst'[22]. It was pointed out in 1845 that "farmers use *S.brevistigma* to rid their fields of white ants'. Also, that the sap of the Asclepiads was bitter and acrid and in the West Indies given to children in doses of a teaspoon to a tablespoon as a remedy for worms[23]. These were hardly the attributes of a drink that was earlier enthusiastically imbibed three times a day. The contradiction perhaps had not been lost on the *Sarcostemma*-using Vedic commentators, who were as clueless to the identity of the original Soma as the later-day European enquirers. John Stevenson, in his 1842 translation of the *Samaveda*, says that Soma is S.viminale and that 'according to the commentator, it is pressed and mixed with barley and allowed to stand for nine days.' Fermentation of the juice was probably a means of camouflaging its bitterness. Displaying an orientalist bent of mind, not uncommon those days, William Dwight Whitney could say patronizingly, in 1853, 'the simple-minded Arian [sic] people ... had no sooner perceived that this liquid had power to ... produce a temporary frenzy... than they found in it something divine'[24].

In 1855, Max Muller dug up an old Ayurvedic verse[25], which described Soma as a black creeper, sour, leafless, yielding milk, having fleshy skin, dissolving (or producing?) phlegm, causing vomiting, and eaten by goats. Though the description fitted Sarcostemma, Max Muller asked a valid question : If this freely available plant was indeed the Soma, then why did the Brāhmaṇa-period priests have to use *putika* as a substitute? The passage was not taken up for discussion till 30 years later, when attention was drawn to its lateness and to the uncertainty whether the drug dissolved phlegm or produced phlegm.

Soon, field data started becoming available from different parts of the country. In 1866, J. Forbes Watson described the "Telugu" *Soma-latā* as *S.brevistigma*, and the "Sanskrit" *Soma-latā* as *Ruta graveolens*[26]. In 1874, Arthur Coke Burnell pointed out that the Hindus on the Coromandel coast used *S.brevistigma* in their rites, while their counterparts on the Malabar coast used a different plant, *Ceropegia decaisneana or C.elegans*[27].

In 1873, Rajendra Lal Mitra (1822 or 24-1891), who later became the first President of the Asiatic Society, Calcutta, proposed a new hypothesis, doing away with the ancient

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texts as it were. The Soma juice, he said, was merely a figure of speech. The Soma plant did not provide a drink by itself. Rather, like the hops, it was added to accelerate the fermentation of paddy and barley decoction to produce a kind of a beer. It is a measure of the confused scholarship on the subject that this dubious hypothesis received wide support, including from Max Muller, who concluded, to his satisfaction, that the original Soma was hop, later replaced by a *Sarcostemma*. He even suggested that the two words were etymologically related ![28]

A hundred years after Du Perron, Haoma finally entered the debate. In 1878, Friedrich Spiegel reported afresh that the Indian Parsees sent their priests to Kerman to bring Haoma[29]. In December 1884, the naturalist A.Houtum-Schindler wrote from Teheran that the plant used by the Zoroastrians in Kerman and Yezd agreed with the *Sarcostemma*[30]. In 1885, the botanist George Watt wrote that Dr Dymock, of Bombay, had sent him a Haoma plant, which was *Periploca aphylla.*[31] That these were mis-identfications soon became obvious.

During 1884-86, the British sent a commission to Afghanistan to determine its boundaries in conjunction with a similar commission from the Tsarist Russia. One of the members of the British commission was a professional botanist, James Edward Tierney Aitchison, who was asked to report on the Afghan flora and fauna. Earlier, he had supported the view that Soma was wine. The assignment made him change his opinion. While in Afghanistan, in 1885, he received from the Bombay-based Parsi scholar, [Sir] Jivanji Jamshedji Modi, samples of Hom for identification. Aitchison wrote back as follows.

"The specimens you sent me are the twigs of a species *Ephedra*... A species grows all over this country—Baluchistan, Afghanistan, Kashmir and Western Thibet—which seems to be identical with the species received. This species is here, in all this country, called *Hum* (pronounced as the English word whom, also Huma). In Baluchistan, it, as well as totally a distinct plant, Periploca aphylla, is called Hum. It grows equally on exposed hills and valleys, consisting of `branches and sprigs', one mass of upright twig, if you notice, being made of joints like the joints of the fingers. When covered with male flowers, the bush (from 1 to 2 feet) is golden coloured, and the twigs are more or less so ... This plant has no leaves. It is all twigs and jointed. Among the Pathans of the Khyber pass and all over that country, the twigs are, with water, made into a decoction, and employed very largely as a house-hold remedy in sickness, and are considered as possessing health-giving and healing properties. Owing to a general likeness between the stiff rod-like growth, upright and erect, of the two plants, in Baluchistan, the natives equally give both the same name. No one would mistake the jointed and true Hum for the non-jointed false Hum, Periploca."[32]

Aitchison concluded by saying, "before your letter and specimens came, I had made up my mind that the *Ephedra* was the nearest to the 'Soma' plant that I got to, but as it was stated that the Parsees employed the twigs of Periploca, it rather put me out. Your specimens are all on my side"[33].

(This letter was included by Modi, in 1922, in his book "The Religious Ceremonies and Customs of the Parsees"). On return to England, Aitchison published, in 1887, a

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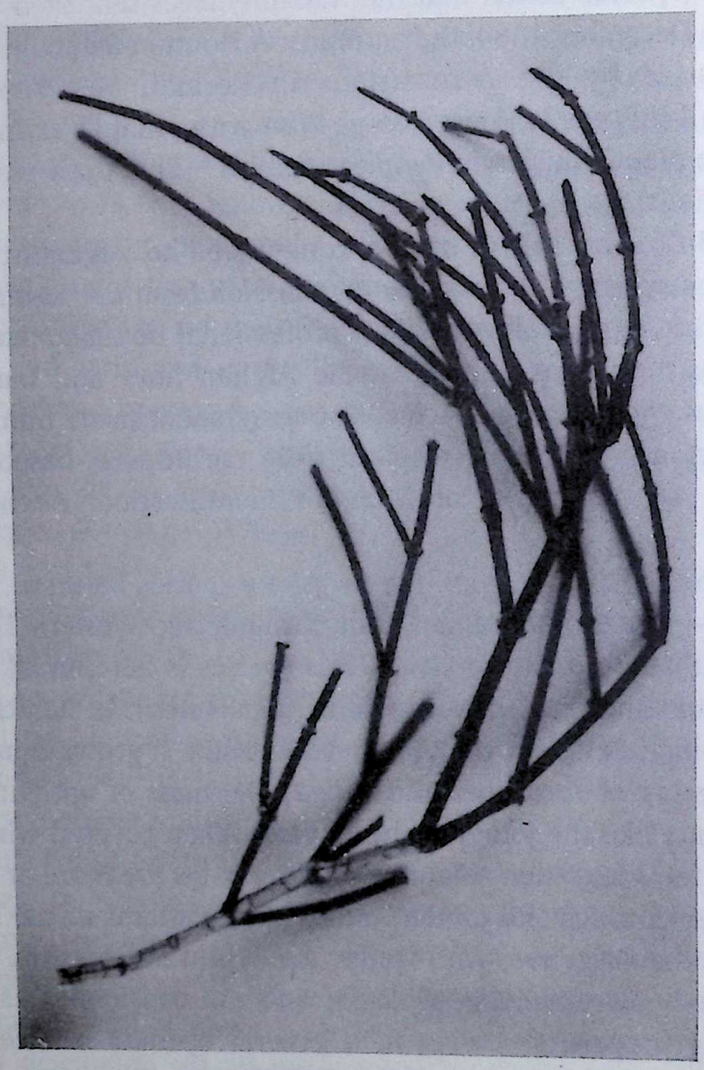

Fig. 1. Dried twigs of *Ephedra gerdiana*.

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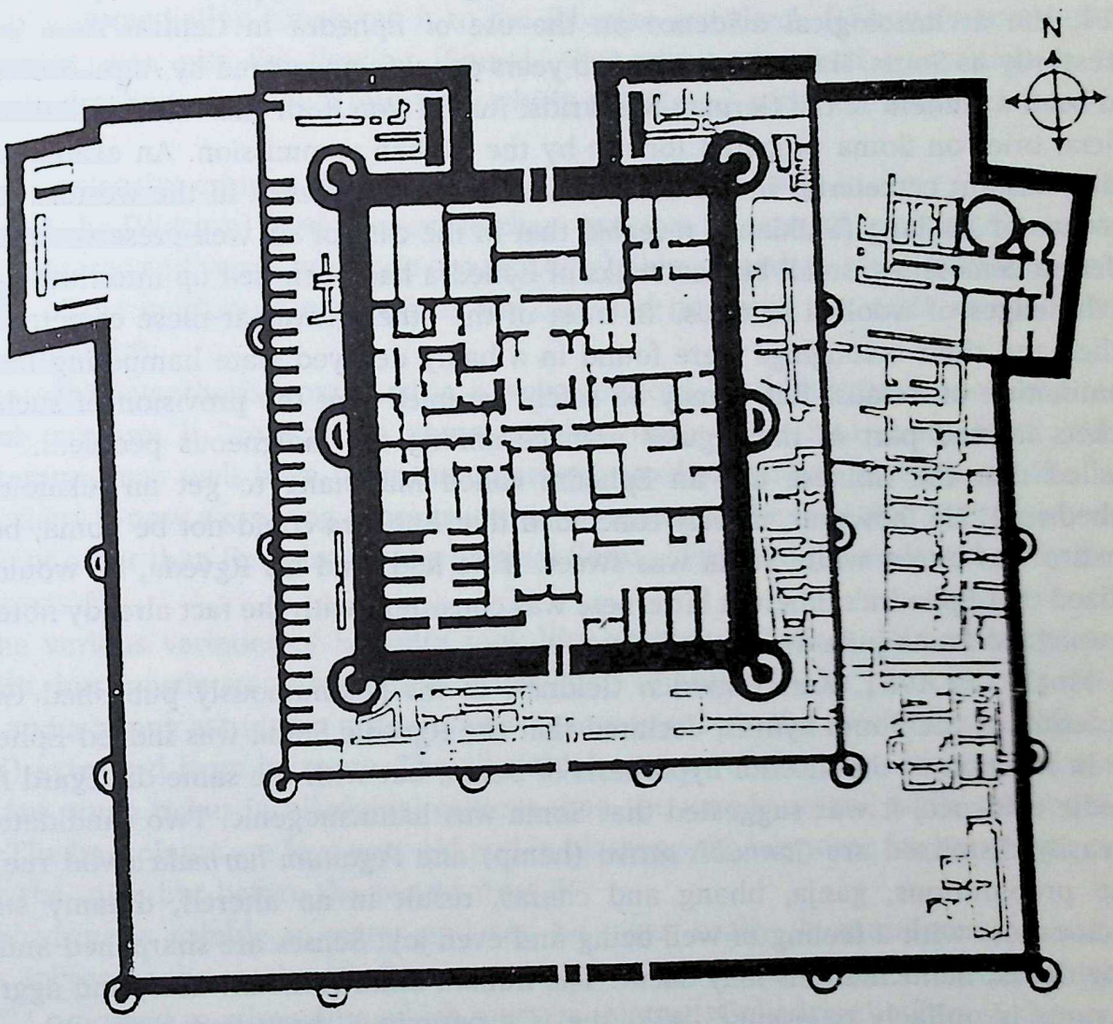

Fig. 2. The ritually significant rectangular complex at Togolok 21 in the Murghab Delta. The Ephedra room is to the left (Kochhar, 2000).

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technical report on his findings. Further support came in 1893, when Joseph Bornmuller wrote (in German) about his encounter with a Zoroastrian priest in Yezd carrying Hum, which he at once recognized as *Ephedra distachya*. He added that large quantities of it were dried and sent to Bombay every year[34].

In 1912, Macdonell and Keith, unable to cut through the maze of conflicting opinions, declared in their *Vedic Index* that 'it is very probable that the plant cannot now be identified'[35], thereby conveniently exempting the geographical interpretations of the Ṛgveda from the severest constraint that the *Ṛgveda* itself supplies. Two years later, in 1914, the archaeological evidence on the use of Ephedra in Central Asia (but not necessarily as Soma/Haoma) about 2000 years ago was uncovered by Aurel Stein,[36] who had been a student of the German Sanskritist Rudolf Von Roth and was familiar with the official brief on Soma prepared for use by the Afghan commission. An examination of widely distant cemeteries in the Lou-lan area of the Lop desert in the western Chinese province of Xinjiang (Sinkiang) revealed that in the case of six well-preserved graves in different cemeteries, small broken stalks of Ephedra had been tied up into little bunches on the edges of woollen shrouds. 'In most of the other graves at these cemeteries, the bodies and their belongings were found in a badly decayed state hampering the close examination of details. But it may be safely assumed that the provision of such small packets formed part of the regular practice among the indigneous people...."[37] Stein recalled that the Chinese use an Ephedra called Ma-huang to get an alkaloid drug (Ephedrine). He, however, naively concluded that Ephedra could not be Soma, because Ephedra was bitter, while Soma was sweet. If he had read his Ṛgveda, he would have realized that Ephedra's inherent bitterness was consistent with the fact already noted that the unmixed Soma juice was called tivra.

Finally, in 1951, Karl Friedrich Geldner, in his posthumously published German translation of the Soma hymns, declared that the Ṛgvedic Soma was indeed Ephedra[38].

In reaction to the alcohol hypothesis of Soma, but with the same disregard for the Ṛgvedic evidence, it was suggested that Soma was hallucinogenic. Two candidates that are easily dismissed are *Cannabis sativa* (hemp) and *Peganum harmala* (wild rue). The hemp preparations, ganja, bhang and charas, result in an altered, dreamy state of consciousness with a feeling of well-being and even joy. Senses are sharpened and, with strong doses, hallucinations may occur. The human mind turns inwards, and aggressive behaviour is unlikely to occur.[39] Wild rue is a perenimal, branched herb with whitish flowers and narrow leaves. Its seeds are used as a remedy for many different diseases. The plant is fairly common in parts of Bihar, Uttar Pradesh, Madhya Pradesh, Maharashtra, Rajasthan, Sind, Baluchistan and Waziristan. Unlike the Soma plant, there is nothing "flamentous" in P.Harmala, which, moreover, has a seductive rather than stimulating effect.[40]

In 1968, the eminent ethnomycologist, R.Gordon Wasson, introduced another Soma candidate : the mushroom fly-agaric, *amanita muscaria*. The 8-20 cm high mushroom has a white stem and a large (5-15 cm diameter), mostly red, cap with white patches.[41] Fly-agaric owes its hallucinogic properties to isoxazole compounds, which pass the human renal system intact and are thus present in the urine of the mushroom eater.[42] Since

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ancient times, the fly-agaric has been used as a hallucinogen in northern Siberia, where the custom of urine drinking has been well-documented.

Wasson suggested that the mushroom fly-agaric be identified with the Soma/Haoma plant, and its orange-coloured juice with the soma/Haoma drink. He went on to distinguish between two forms of Soma : the first form of a direct drink; and the second form of the urine of the primary drinker. He claimed to have found passages in the *Ṛgveda* and *Yasna*, which referred to the Soma/Haoma urine.[44] It is recorded that when it was casually mentioned to Wasson that the *Ṛgveda* refers to the "pissing" of Soma (RV 9.74.4), he immediatley connected it to the Siberian practice.[43] (Wasson's translation : The swollen men piss the flowing [Soma]. Generally understood translation is "the *Maruts* (Rudras) pouring down rain, figuratively considered as the urine of their heavenly horses."[45]

In an extensive critique, Brough pointed out that Wasson was in error : "Some of the translations he [Wasson] used were misleading, and that he seemed to arbitrarily connect Ṛgvedic phrases and verses which do not properly belong together. More matter-of-factly, the juice of the mushroom comes from the cap, and not from the stem, as the Ṛgveda would demand.[46]

Wasson's hypothesis, contained in a well-produced, well-illustrated book, did serve a useful purpose; it brought the Soma problem once again into sharp focus. While Sarcostemma may well have been the commonly-used substitute for Soma in the later period, there is now a growing consensus among experts in the field that 'there is no need for a plant other than Ephedra for the original Soma... Ephedra fits each and every detail of the texts'.[47]

The various varieties of Ephedra look like bushes of leafless, jointed twigs, some prostrate, but mostly standing erect 1-6 feet high (Figure 1). The plant has a pine-like aroma and a strong astringent taste. It owes its importance to the alkaloid Epherdrine ($C_{10}H_{15}ON$) extracted from its twigs. The alkaloidal content of the plant increaes with age. Twigs are much richer in alkaloidal content than the woody stems, while the roots are bereft. The best plants are four year old and in blossom; the best time for harvesting twigs is after the rains but before the winter frost.[48]

Ephedrine is soluble in water and can be taken orally. It stimulates the nervous system, increases the intake of oxygen, and acts as a restorative and a mild anaesthetic agent.[49] Compared to adrenaline which must be injected, Ephedrine's effect is slower and less intense but more persistent. It dilates the pupil and contracts the uterus. Soma's role as an aphrodisiac can only be attributed to the general feeling of euphoria that Ephedrine causes. In excessive doses, ephedrine causes nervousness, insomnia, headache, vertigo, palpitation, sweating, nausea and vomiting. When the Ṛgvedic poet asks Soma to be 'sweet to our heart' (RV 8.68.7) and 'wound not our heart with dazzling flame' (RV 8.68.7), he is probably requesting for exemption from the effects of over-indulgence.

Ephedra's utility as a geographical diagnostic comes from the fact that it does not grow every where, and all its varieties do not contain *Ephedrine*. Four species of Ephedra are native to the mountaineous regions of north India, Afghanistan and Iran : *E.gerardiana* (E.vulgaris, E.distachya), *E.major* (*E.nebrodensis*); *E.intermedia* and *E.pachyclada*. They all

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contain Ephedrine. In addition, there is *E.foliata,* which grows in the plains of south Punjab and Rajasthan. It does not contain any appreciable quantity of *Ephedrine*. The rest of India is not the natural habitat of any species of *Ephedra*. Local names of *Ephedra* were recorded a hundred years ago. Thus *E.gerardiana* is called *asmania, butshur, budshur* and *chewa* in Punjab, Phok in the *Śatluj* valley; *tse, tsapatt* and *trano* in Ladhak; and *khanda* and *kharna* in Kunawar (not identified).[50]

Since the Ṛgvedic Aryans could pluck twigs from the wayside, they must have lived in the mountainous regions. Since the Avestans were also using Soma, the common residence can be narrowed down to the Hindu Kush and its western environs. The species native to Chitral, Baluchistan and Afghanistan, E.pachyclada, can then be singled out as the Soma of the Ṛgveda. The name for the plant still survives in the region, as noted by Aitchison : Hum in the Herat valley, as well as in Baluchī, Pashto and Brahui, and Som in Gilgit, Chitral and Kafiristan. The remarkable fact that the same name designates a plant in a vast area also points towards its great antiquity.

When we identify *Ephedra* as Soma and place the Ṛgvedic people in the *Ephedra*-habitat Hindu Kush, all the diverse pieces of the puzzle fall into place. The vast *Ephedra*-growing area in Afghanistan and Iran was occupied by or was accessible to the Indo-Iranians, who could develop a common Soma/Haoma cult. As the Indo-Aryans moved eastwards, their distance from Soma increased, first cutting down the supply and then stopping it altogether. Finally, in the plains, Soma's place in the rituals was given to the substitutes. In course of time, Soma became a mythical plant.

In its transition from an easily available herb that could be processed by husband and wife in their home to a myth even for the later-day medical celebrities, Soma records the distance the Indo-Aryans traversed, figuratively and literally, from the Ṛgvedic times to the classical period.

Archaeological evidence

Archaeological evidence for the cultic use of *Ephedra* has been uncovered in the *Murghab* delta (known to the Greeks as *Margiana*) in southern Turkmenistan.[51] At Togolok 21 (with a calibrated radiocarbon date of 1745 BC)[52], archaeologists unearthed a huge rectangular complex, 130m x 100 m in size, with circular turrets at the corners and semi-circular ones at mid-walls. Inside this was another rectangle, much smaller, but also with circular and semi-circular turrets. All along the inner side of its western wall, there were 30 odd narrow rooms (Figure 2).

Inside this rectangle is the 'fortress', measuring 50 m x 60 m with 4.5 m thick walls, and turrets. In the middle of the northern wall, there is a central portal, flanked by two monumental pylons. One of the rooms inside the fortress is plastered white with gypsum. Along its walls are special brick platforms into which vessels have been sunk. Chemical analysis has revealed that the organic material from inside these vessels contains microscopic twigs of *Ephedra* as well as poppy. Traces of poppy were found on the stone mortar and pestle also. It seems that the purpose of the apparatus was to prepare a sacred drink.

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The eastern wall of the outermost rectangular structure contained a niche near the northern corner, which has a number of connected rooms. Walls and floors of these rooms were also plastered white with gypsum, like the inner *Ephedra* room. The passages from the rooms lead to the northern side of the niche, where two round brick-faced altars have been dug into the earth. The smaller, flat-bottomed altar contained a half-metre thick layer of compressed ash. It seems to have been dedicated to the fire cult. The larger altar, conical and deep, has a shell hearth in the centre with remnants of coal. There is a large stain on its wall, suggesting that this altar was used for ritual libations.[53]

Similar structures have been found at Gonur 1 (dated 1887 BC)[54] and Togolok 1. At Gonur 1, the vessels contained remnants of poppy and cannabis in addition to Ephedra.[55] It is noteworthy that while *Ephedra* has been identified with the Soma/Haoma plant of the Ṛgveda and *Avesta*, there is no indication of the use of poppy and cannabis in these texts. In Ṛgveda, one drank Soma to keep awake; addition of poppy to the drink would have had an opposite effect.

Who the Togolok 21 people were, and how they were related to the Avestan-Ṛgvedic people are not known. Nevertheless, the evidence of the use of *Ephedra* in the region is significant.

ACKNOWLEDGEMENT

The material in this chapter has been taken from Kochhar (2000)..

NOTES

To help place an author's work in context, the original date of publication is given, rather than of tranalsation or reprint. Enclosure of a page number in square brackets denotes that the reference is to a reprint, which very often is a *facsimili* of the original.

1. A convenient, if not always the best, source of English translation of the Ṛgveda in Griffith (1896).
2. Brough (1971; 331).
3. SBE (1887, [31 : 230-47]).
4. Hillebrandt (1927, [I:129-51]) provides a summary of the characteristics of the Soma plant, as culled from the Ṛgveda and *Avesta*. For a useful summary of information in later texts, see O'Flaherty (1968).
5. Falk (1989 :79).
6. Modi (1937 :[283]).
7. Hillebrandt (1927; [I : 145])
8. Ibid. [175]
9. Ibid. [154-6].
10. Modi (1937: [205]).
11. Ibid. [182].
12. Hillebrandt (1927, [I:156]).
13. Ibid.[158]
14. O'Flaherty (1968 :96)
15. Hillebrandt (1927, [I:136])
16. Ibid.[159].
17. O'Flaherty (1968 : 96-7)
18. Ibid.94

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19. Ibid.99
20. Ibid.102
21. Ibid.103
22. Watt (1890 :249)
23. O'Flaherty (1968 :106).
24. Ibid.106-7.
25. The verse occurs in Dhurtasvami's commentary on the *Āpastamba Śraūtasūtra* (O'Flaherty 1968 : 100).
26. O'Flaherty (1968 : 108).
27. Ibid.110.
28. Ibid. 109.
29. Ibid.110.
30. Ibid. 118.
31. Watt (1890 : 248).
32. Modi (1937 : [285]).
33. Ibid.[286].
34. O'Flaherty (1968 :122).
35. Macdonell & Keith (1912, [II:475]).
36. Stein (1931; 503).
37. It is now suspected that Stein might not have found *Ephedra* at all; some of his floral samples were examined in Kew Gardens, and found to be the remains of horsetails (*Equisetum equisetaceae*). Nyberg (1995 : [399]).
38. Geldner (1951, III:1)
39. Nyberg (1995 : [386]).
40. Nyverg (1995 : [390]).
41. Nyberg (1995 : [390]).
42. Nyberg (1995 : [392])
43. Nyberg (1995 : [393]).
44. Wasson (1968 : 25).
45. Brough (1971 : 346).
46. Nyberg (1995 : [393]).
47. Falk (1989 : 57). Similarly, Nyberg (1995: [400]) : 'the ephedras best meet both the textual and pharmacological requirements for the botanical identification of soma/haoma'. However, Needham (1974: 5.II :116) accepts Wasson's hypothesis. More surprisingly, a well-regarded Sanskrit scholar writing two decades later calls Soma a 'hallucinogenic drink' [Brockington, 1995 : [7]) and accepts, though tentatively, Wasson's identification (Brockington, 1995 : [17]). Recently, Brockington, has made his position clear in a personal communication : 'Harry Falk has mounted a powerful argument in favour of an older identification with members of the Ephedra species; much of what he says is very plausible, and on balance I regard it as the most probable hypothesis yet advanced, although its weakest point in my mind is the relatively slight effects of ephedrine, compared with those claimed for Soma'. As to the last point, one wonders whether the Indo-Iranians were carried away by the novelty of Soma/Haoma, the like of which they had never tasted before.
48. Sastri (1952 : 177-8).
50. It is noteworthy that *Ephedrine* figures in the International Olympic Committee's blacklist of banned substances (Day 1998 : 18)
50. Watt (1989 : 251-2).
51. Sarianidi (1986 : 5-6).
52. Possehl (1994 : 116).
53. Sarianidi (1987 : 49).
54. Possehl (1994 : 37).
55. Sarianidi (1994 : 388).

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ABBREVIATIONS

ABORI	:	Annals of Bhandarkar Oriental Research Institute, Poona.
Adyar	:	Descriptive Catalogue of Sanskrit Mss. Compiled by V. Krishnamachary Ayyar,1947.
AI	:	Ancient India.
AK	:	Report on Search for Sanskrit Mss. in the Bombay Presidency, 1891-95. Compiled by A.V.Kathvate, Bombay, 1901.
ALB	:	Adyar Library Bulletin, Madras.
Alwar	:	Catalogue of Sanskrit Mss. in the Library of H.H. The Maharaja of Alwar. Compiled by P Peterson, Bombay, 1892.
Arch.Or	:	Archiv Orientalani.
ASB	:	Asiatic Society, Bengal (Catalogue of Mss. on Medicine, not published).
BBRAS	:	Descriptive Catalogue of Sanskrit and Prakrit Mss. in the Library of the Bombay Branch of the Royal Asiatic Society. Compiled by H.D.Velankar, Vol.I-IV, Bombay, 1925-30.
BDCRI	:	Bulletin of Deccan College Research Institute, Poona.
BIIHM	:	Bulletin of the Indian Institute of History of Medicine, Hyderabad.
Bik	:	Catalogue of Sanskrit Mss. in the Library of H.H. The Maharaja of Bikaner. Compiled by R.L. Mitra, Calcutta, 1880.
Bikaner	:	Catalogue of Anup Sanskrit Library, prepared by Kunhan Raja and K.Madhava Krishna Sarma, Fascicules III and IV, Bikaner, 1948.
BIM	:	Bulletin of Indian Museum, Calcutta.
BITCM	:	Bulletin of Indian Traditional Centre for Medicine, Madras.
BJ	:	Bhavan's Journal, Bharatiya Vidya Bhavan, Bombay.
BNISI	:	Bulletion of the National Institute of Sciences of India (now Indian National Science Academy) New Delhi.
Bom.Univ	:	A Descriptive Catalogue of Sanskrit and Prakrit Mss. (Bhagavat Singhiji and H.M. Bhandarkar Memorial Collections) in the Library of the University of Bombay. Compiled by G.V. Devasthali,2 Parts, Bombay. 1944.
BORI.D.	:	Descriptive Catalogue of Goverment Collections of Sanskrit Mss. in Bhandarkar Oriental Research Institute, Poona. Compiled by H.D.Sharma, Vol.XVI, Pt.I, *Vaidyaka*, Poona, 1930.
Burnell	:	Classified Index to the Sanskrit Mss. in the Palace at Tanjore. Compiled by A.C.Burnell, London.
CHI	:	Cultural Heritage of India.
CS	:	Current Science, Bangalore.
Dtsch-Apoth-Ztg	:	Deutsch Apoth Zeitg.
ERE	:	Encyclopaedia of Religion and Ethics. (Ed) J.Hastings.
GJRI	:	Mss. deposited in the Library of Ganganath Jha Research Institute, Patna.
Granthapura	:	Revised Catalogue of Palace Granthapura Library, Trivandrum. Compiled by K.S. Sastri, Trivandrum.
GSI	:	German Scholars in India. Cultural Department of the Embassy, FRG, New Delhi.
HPS	:	Notices of Sanskrit Mss. (2nd series), vol. I, 1900; vol. II, 1904. Compiled by H.P. Sastri, Calcutta.
IA	:	Indian Antiquary, Calcutta.
IC	:	Indian Culture, Calcutta.
IHQ	:	Indian HIstorical Quarterly, New Delhi.
IHR	:	Indian Historical Research.
IJHM	:	Indian Journal of History of Medicine, Hyderabad.
IJHS	:	Indian Journal of History of Science, New Delhi.

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IJS : Indian Journal of Surgery.

IO : Catalogue of Sanskrit Mss. in the Library of India Office, London. Compiled by J. Eggeling, Pt. II, *Lexicography* (1989), Pt. V. *Medicine, Astronomy, Mathematics*, etc., London.

JAHS : Journal of Andhra Histroical Society.

JAOS : Journal of American Oriental Society.

JASB : Journal of the Asiatic Society of Bengal, Calcutta.

JBBRAS : Journal of the Bombay Branch of the Royal Asiatic Society, Bombay.

JESHO : Journal of Economic and Social History of the Orient.

JIH : Journal of Indian History.

JMSUB : Journal of Maharaja Sayaji Rao University of Baroda.

JOI : Journal of the Oriental Institute, Madras.

JOL : Journal of the Department of Letters, Calcutta University.

JRAS : Journal of the Royal Asiatic Society (Great Britain & Ireland).

K : Catalogue of Sanskrit Mss. existing in Central Provinces. Compiled by F. Kielhorn. Nagpur.

KH : A Classified and Alphabetical Catalogue of Sanskrit Mss. in the Southern Division of the Bombay Presidency, Fascicule. 1. Compiled by F. Kielhorn, Bombay.

L : Notices of Sanskrit Mss. Vols. 1-IX, Calcutta. Compiled by R.L.Mitra. Vols.X, and XI are by H.P. Sastri.

MD : Descriptive Catalogue of Sanskrit Mss. in the Government Oriental Mss. Library, Madras. Compiled by S. Kuppuswamy Sastri and Others.

MASB : Memoirs: Asiatic Society, Bengal.

MASI : Memoirs: Archaeological Survey of India.

MIM : Memoirs: Indian Museum.

Moodbidri : *Kannada Prantīya Granthasūci* (A descriptive Catalogue of Mss. Collection of different religious centres at Moodbidri and at other places), (Ed) Pandit K. Bahubali Vidyabhusan Sastri, Kashi, 1948.

MSP : Maharastra Sahitya Patrika.

MT : Triennial Catalogue of Sanskrit Mss. in the Govt., Oriental Mss. Library, Madras, by S. Kuppuswami Sastri, and others.

Mysore I : Catalogue of Sanskrit Mss. in the Govt. Oriental Library , Mysore, 1922.

Mysore II : A Supplemental Catalogue of Sanskrit Mss. secured for the Govt. Oriental Library, Mysore.

Nepal : Catalogue of Palm-leaf and Select Paper Mss. belonging to the Durbar Library, Nepal. Compiled by H P. Sastri and an Introduction by C. Bendall, Calcutta.

Oudh : Catalogue of Sanskrit Mss. in Oudh Provinces, 1883-1893. Compiled by Devi Prasad Pandit.

OXF : Catalogue Codicum Sanscriticorum Bibliothecae Bodlienane. Compiled by Th. Aufrecht, Oxford, 1846.

PAIOC : Proceedings of All India Oriental Conference.

Peters : A Report on the Search for Sanskrit Mss. in the Bombay Circle between 1882-1898. Compiled by P. Peterson.

PO : Poona Orientalist.

Poleman : A Census of Indian Mss. in USA and Canada. Compiled by H.I. Poleman, American Oriental Series No.12, American Oriental Society, Connecticut.

PUL : A Catalogue of Sanskrit Mss. in the Punjab University Library. Compiled by Punjab University, Lahore.

QJMS : Quarterly Journal of Mythic Society, Bangalore.

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RORI	:	A Catalogue of Sanskrit and Prakrit Mss. in the Rajasthan Oriental Research Institute (Jodhpur Collection). Compiled by Padmashri Muni Jinavijaya, Pt.1.
Rep	:	Report on the Search of Sanskrit Mss. Compiled by H.P. Sastri, Calcutta.
Rice	:	Catalogue of Sanskrit Mss. in Mysore and Coorg, Bangalore. Compiled by Rice.
SC	:	Science and Culture, Calcutta.
SML	:	Sarasvati Mahal Library, Tanjore.
Stein	:	Catalogue of Sanskrit Mss. in the Raghunatha Temple Library of H.H. The Maharaja of Jammu and Kashmir. Compiled by A. Stein, Bombay.
Taylor	:	Catalogue Raisonnee of Oriental Mss. in the Library of the Collection in Fort St. George (now in-charge of the Board of Examiners), Vol. 1, East India Company Mss. Compiled by Taylor, Madras.
TD	:	Descriptive Catalogue of the Sanskrit Mss. in the Tanjore Maharaja Sarfoji's Saraswati Mahal Library, Tanjore. Compiled by P.P.S. Sastri.
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VIJ	:	Visvesvarananda Indological Journal, Hoshiarpur.
VUOJ	:	Venkateswara University Oriental Journal, Tirupati.
VVML	:	Vallabha Vaisnava Matha Library, Nathdwar, Rajasthan.
VVRI	:	A Catalogue of Visvesvarananda Vedic Research Institute Mss. Collection. Compiled by Visva Bandhu, Hoshiarpur, 1959.
W	:	Handschriften Verziechinese Konighichen Bibliothek, Berlin, Vol. I, 1853.
WJKSA	:	Wiener Zeitshrift der Humboldt Universitat, Berlin.

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